



Picxel ePAGE

**Bitmap Image file
format support**



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Document number PICSEL-ESF0005B

April 2002

<http://www.picxel.com/>

Introduction



On handheld computers, traditional applications typically rely on synchronization with a PC to convert content from the original document format into a simpler format used by the device. This creates at least three problems. Firstly, some visual integrity is inevitably lost in the conversion process from a rich format to a simpler one, resulting in documents that do not look exactly like the original. Secondly, the reliance on a PC for synchronization means that direct network access is difficult, and the device is severely hampered when untethered from the PC. Thirdly, traditional applications take a monolithic approach, converting only a single format so that separate applications are needed for each different document type.

PicseI's ePAGE applications present a new concept in document viewing software. Unlike traditional approaches, the viewer can access native files, so synchronisation is not necessary and files can be grabbed straight off PC filing systems, flash cards and networks/internet without the need for pre-conversion. ePAGE deals directly with the original document in its native format, and aims to faithfully represent all of the features of the original. Moreover, the novel software architecture based on PicseI's ePAGE technology enables multiple format types to be richly supported in a single application.

ePAGE achieves a breakthrough in its ability to interpret and render complex file formats. Many apparently straightforward formats have in the past encountered difficulties even when used in their original application software on a different platform, for example when going from a PC to a Macintosh. Sometimes these files assume characteristics of the computer on which they are used, such as the screen size or byte order, and such assumptions have to be unravelled when using them on a different device. To compound the challenge, some formats may contain proprietary features which are not revealed to the public, and which even have been forgotten within the originating company. Others, such as HTML, have written standards yet are still subject to differing interpretations as evidenced by the varying treatment of web pages in proprietary browsers.

ePAGE supports the most popular global file formats. The formats interpreted by ePAGE are richly expressive, containing not just text but sophisticated layout and rendering features, rich fonts, colour, images, tables, graphics and many other document features. PicseI is continuously developing its file format support to eventually cover every feature of the native file. With such a wealth of features across many document types, this is inevitably an ongoing process, with milestone releases of new functionality planned at periodic intervals. The approach involves researching the feature set most commonly found in real documents, building support early for the most frequently used elements, and ensuring these features are reproduced with total faithfulness to the original. The emphasis of ePAGE is on displaying rich content rather than on reproducing the document creation facilities of the original application.

This document describes the features supported in ePAGE. This level of support already covers the vast majority of characteristics that occur in day to day documents of this type, and the specific features are described with notes where appropriate. Those features planned for future implementation are also described, for completeness.

Bitmap Images

A bitmap image is a picture made up of a grid of pixels (dots), as compared to a vector path which is made up of lines between coordinates. There are a number of file formats popular for storing bitmap images, each with benefits and drawbacks to consider. The main image formats supported by ePAGE are JPEG, GIF, PNG and BMP.

Many document formats, such as HTML and Word, allow bitmap images to be included in various other formats, and do not directly define them. This is convenient as it allows specialists (such as the Joint Photographic Experts Group) in image compression and other areas to define the image formats separately from the document formats, although the extra network delay of requesting a separate file may become an issue.

JPEG

JPEG is a format defined by the ISO Joint Photographic Experts Group. It is well suited to efficient compression of photographs, which it does by deleting unimportant content according to the kind of detail that people notice; in particular, it removes more chrominance (colour) information than luminance (brightness), since the human eye is more sensitive to luminance.

Although JPEG is less well suited to cartoon or diagram images, ePAGE will of course render the image data optimally. ePAGE's support for JPEG includes exactly the same features of JPEG as those allowed by almost all other software.

JPEG also supports progressive rendering for more satisfying network downloading.

| Feature | Support | Notes |
|------------------------------------|---------|-------|
| JFIF file format | Yes | |
| 24 bit full colour images | Yes | |
| 8 bit grey scale images | Yes | |
| Discrete Cosine Transform encoding | Yes | |
| Huffman encoding | Yes | |
| Progressive decompression | Yes | |
| Progressive rendering | Yes | |
| Pixel density (dots per inch/cm) | Yes | |

Future Support

Picsel continuously strives to enhance the feature set of its software. In addition to the above features supported in Version 1.0, the following features are planned to be incorporated in future versions of the Picsel software. (The ordering in the list does not imply any measure of priority among the items.)

| |
|---|
| JPEG2000 file format |
| Thumbnail image (uncompressed, indexed colour, JPEG compressed) |

GIF

GIF, the CompuServe Graphics Interchange Format, is widely used on web pages. It can store interlaced rows of pixels, appearing as progressive rendering, as well as binary transparency and animation. It supports a maximum of 256 indexed colours, but no full-colour images.

GIF uses LZW compression to encode repeating patterns of pixels of certain colours and save file sizes, but the animation requires re-encoding of the image, which wastes space.

| Feature | Support | Notes |
|--|---------|-------|
| GIF87a format | Yes | |
| GIF89a format | Yes | |
| 1, 2, 4, 8, 16, 32, 64, 128 or 256 indexed colours | Yes | |
| Compressed image data | Yes | |
| Transparent colour mask | Yes | |
| Row interlacing for progressive rendering | Yes | |

Future Support

In addition to the above features, the following will be added in future releases of Picsel software. The ordering in this list does not indicate any priority.

| |
|-----------------------|
| Multi-frame animation |
|-----------------------|

PNG

The Portable Network Graphic (PNG) format, does not use any patented or proprietary methods, and is intended as a replacement for GIF. Its compression is good for cartoons and diagrams; less so for photographs.

PNG supports progressive rendering using two dimensional interlacing, alpha-channel transparency, as well as gamma correction and indexed colour. It supports up to 48 bits of full colour or 16 bits of grey-scale, per pixel. The related MNG format supports animation.

| Feature | Support | Notes |
|---------------------------------------|---------|-------|
| PNG file format | Yes | |
| 2-dimensional progressive interlacing | Yes | |
| Full colour images | Yes | |
| Indexed colour images | Yes | |
| Grey scale images | Yes | |
| Alpha-channel graduated transparency | Yes | |
| LZ77 compressed image data | Yes | |
| Huffman encoded image data | Yes | |

Future Support

In addition to the above features, the following will be added in future releases of Picsel software. The ordering in this list does not indicate any priority.

| |
|---------------------------|
| MNG multi-frame animation |
| Gamma colour correction |

BMP

Windows Bitmap (BMP) is a format used by MS Windows and other programs which value simplicity over economy. BMP files are almost always uncompressed and so very large.

BMP can include 1, 4, 8 or 24 bits per pixel, allowing both indexed and full colour. Neither transparency nor animation are supported.

| Feature | Support | Notes |
|---------------------------------|---------|-------|
| Windows Bitmap format version 2 | Yes | |
| Windows Bitmap format version 3 | Yes | |
| Windows Bitmap format version 4 | Yes | |
| 1 bit monochrome images | Yes | |
| 4 bit indexed colour images | Yes | |
| 8 bit indexed colour images | Yes | |
| 24 bit full colour images | Yes | |