

## **Web Site Basics — Bandwidth, Resolution & Compression**

Whether you are doing something as simple as sending someone an e-mail with a file attached to it or building something as complex as a Web site with multi-media elements, you need to know the interconnected issues of bandwidth, resolution and compression. Bandwidth refers to the amount of digital data that travels along phone, satellite or cable lines. Resolution refers to the amount of detail you see or hear in a digital file. Compression is applied to large digital files to reduce their size to make them easier to transmit and store.

In order to manage bandwidth, resolution and compression you need to understand a little about how digital files are created and their transmission takes place.

**Digitization** — When a photo, image, animation, sound or movie sequence is digitized it is turned into a series of binary numbers that a computer can interpret through a screen or speakers. Real world, hard copy can be digitized by scanning, as in the case of existing photos and imagery, or captured in a digital form through digital photography, video or sound recording equipment.

**Networks** — When you want to send digital files from one computer to another, the binary numbers that make up a digital file are transmitted by telephone wires, cable, wireless transmission or satellite. The files are typically broken up into packets that then travel to their destination and are reassembled and interpreted at the other end.

**Connection Methods and Speeds** — The kind of connection you have to other computers is determined by the method you are using to transmit data. The most common connections are:

1. 56k modems that use a dial-up service from an ISP (Internet Service Provider) to send data through your telephone line, currently the slowest connection in popular use
2. high-speed modems that send data through your telephone line, a typical way for households to connect to the Internet
3. cable connections that transmit the data through television cables, comparable in speed to the high-speed telephone modem
4. T1 or T3 high-speed trunk lines, the fastest commonly used connection method (most often only available in the business environment)
5. wireless or satellite data transmission

**Computer Speeds** — The way you transmit data affects the size of files you can send to other computers and the speed that they are transmitted. But the other important factor is the speed at which your computer can interpret the digital material. For example, if you transmit digital video over the Internet the receiving computer has to display it. How successfully that digital file is displayed depends on how quickly the computer can process information. Often video sent over the Internet appears jerky with dropped frames and glitches.

**Screen Resolution** — How much detail and how clearly you can see or hear something that is interpreted by a computer depends on a few factors. The most important issue is how much digital information is contained in the file. For visuals (photos, imagery and video), the measurement of information displayed on a screen is stated in pixels per inch (ppi, often erroneously referred to as dpi, dots per inch). A pixel is a very small rectangular primary unit of a computer screen. The grid of pixels that make up your screen is the screen resolution. Some typical screen sizes and resolutions are 14", 17" and 21" screens that can display various resolutions such as 800 pixels by 600 or 1024 pixels by 768.

Fortunately, the digital information you need in order to see an image clearly on your screen is low. 72 ppi (pixels per inch) gives you clear image resolution. When scanning or saving images that will only be displayed on a computer screen, 72 ppi is the optimum resolution. This gives you a smaller file size than images destined to be printed out to hard copy and makes it easier and quicker to transmit them.

**Compression** — A way to make images smaller and more manageable is by using compression. Compression is a mathematical algorithm that is applied to the digital information in a file that eliminates some of digital information in that file. The trade off here is resolution. Typically when you compress a file you lose information that the mathematical algorithm has determined to be non-essential and therefore you lose resolution. Good compression tricks the eye or ear and looks or sounds like the larger file with all the digital information intact.

**Jpegs or GIFs** — Two very popular compression methods are jpegs (signified by the file extension .jpeg or .jpg) or gifs (.gif). These are the two file formats that are used extensively on the Internet. The type of image you want to compress determines the type of compression you should choose. Photographs and images with a lot of detail are best compressed using a jpeg compression method. Logos and graphics with a lot of flat area of colour are best saved as gifs. It is always a good idea to keep your original uncompressed file stored away safely so you can go back to it if you want to change or recompress the image. Further compressing an already compressed image is not usually a good idea.

There are cross-platform issues (Windows versus MAC operating systems) with saving and viewing jpegs. It makes a difference whether your original uncompressed file is a CMYK colour profile or a RGB profile. Always convert CMYK images to RGB before saving them as jpegs if you intend to attach them to emails.

Understanding bandwidth, resolution and compression will help you successfully transmit your images electronically.