

# got bandwidth?

Web Graphics Optimization

# Primary Topics of Discussion:

- 1. What is bandwidth usage?**
2. Why is reducing the amount of bandwidth usage important?
- 3. Five simple tips for reducing the size of your graphical files on the web.**
4. Free tools for optimizing your web graphics.

# 1. What is Bandwidth Usage?

Bandwidth - The amount of data, usually expressed in bits per second (bps) or bytes per second (Bps), that can be transmitted in a fixed amount of time.

Bits — a single numeric value, either '1' or '0', that encodes a single unit of digital information.

Bytes — a sequence of bits; usually eight bits equal one byte.

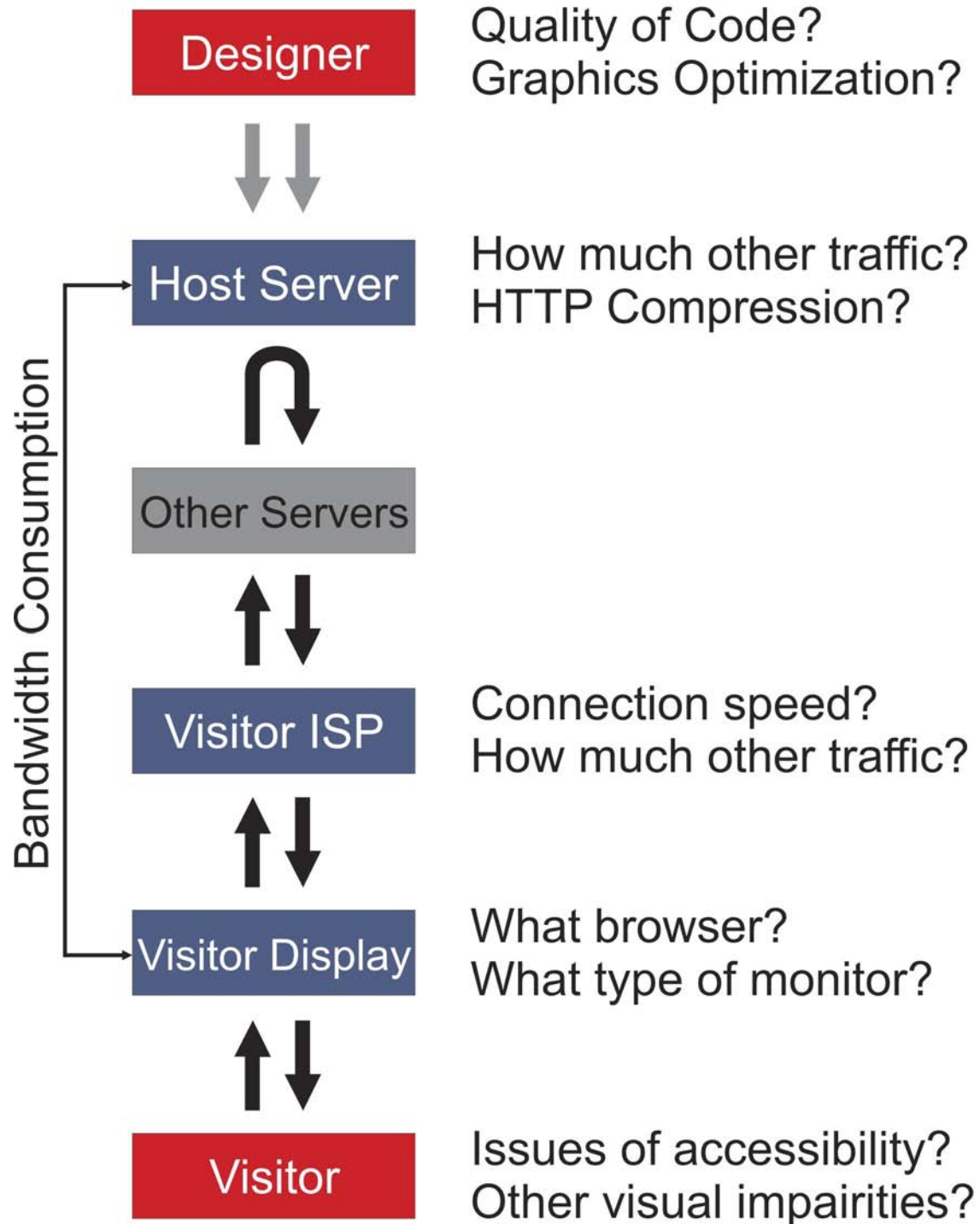
Example:

A web page has 10,000 bytes (10K) of HTML code in it, with links to displaying another 100,000 bytes (100K) of graphical files within that same page.

**Institutional Connections (T1 lines) = 1544.0 Kbps = 193KBps = 0.57 seconds to load page**

**DSL/Cable Connections (Household) = 768.0 Kbps = 96KBps = 1.15 seconds to load page**

**Dial-up Modems (56K) = 53.3 Kbps = 6.7KBps = 16.42 seconds to load page**



## 2. Why is Reducing Bandwidth Usage Important?

**ECONOMIC** – Faster page loads translates into more web pages viewed and/or happier visitors (more return visits). It also can reduce the need for server space, saving an organization money.

**ENVIRONMENTAL** – Faster page loads equals less time online to view the same amount of content (lowering electricity needs), as well as extending the life of older equipment, reducing the quantity of hazardous waste created when producing computer equipment.

**SOCIETAL** – Faster page loads helps to “level the playing field” for individuals who cannot afford (or do not have access to) higher connection speeds, both in the United States and across the planet.

# 3. Five Tips for Reducing Graphical File Sizes

1. Use the optimal file format for the project.
2. Experiment with various levels of compression for your photographs (JPG).
3. Consider the use of lower color bit depths in your "non-photos" (GIF/PNG).
4. Evaluate the need for using anti-aliasing while exporting your images.
5. Consider the avoidance of "Interlaced" (GIFs and PNGs) or "Progressive Loading" (JPG) images.

# got bandwidth?

## Five Graphics Tips

1. Using the Correct File Formats for the Job
2. Adjust JPG Compression Levels
3. Reduce GIF/PNG Color Bit Depths
4. Evaluate Need For Anti-Aliasing
5. Evaluate Need For Interlacing and Progressive Loads

## JPEG file format

### General Advantages:

- Fast download speeds as a result of enormous compression abilities.
- Produce incredibly high quality images for 16- and 24-bit display.
- Can be dynamically introduced into Flash files.

### General Disadvantages:

- Excessive files sizes at low compression settings.
- Substantial dithering on 8-bit display.

**NOTE: .jpg file extensions are only generally needed when publishing photographs to the Web, or when images are being dynamically introduced into Flash.**

# got bandwidth?

## Five Graphics Tips

1. Using the Correct File Formats for the Job
2. Adjust JPG Compression Levels
3. Reduce GIF/PNG Color Bit Depths
4. Evaluate Need For Anti-Aliasing
5. Evaluate Need For Interlacing and Progressive Loads

## GIF file format

### General Advantages:

- The most widely supported graphical file format used on the Web.
- Superior at displaying diagrammatic images.
- Supports transparency and interlacing.

### General Disadvantages:

- Cannot compete with .jpg file quality on 24-bit screen when non-Web safe colors are being used in graphics.
- Cannot be dynamically introduced into Flash files.

**NOTE: .gif file extensions tend to produce better results when looking to display graphical images such as logos, icons and navigational buttons.**

# got bandwidth?

## Five Graphics Tips

1. Using the Correct File Formats for the Job
2. Adjust JPG Compression Levels
3. Reduce GIF/PNG Color Bit Depths
4. Evaluate Need For Anti-Aliasing
5. Evaluate Need For Interlacing and Progressive Loads

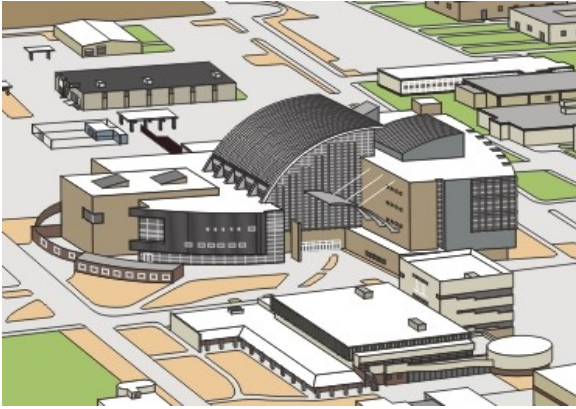
## PNG file format

### General Advantages:

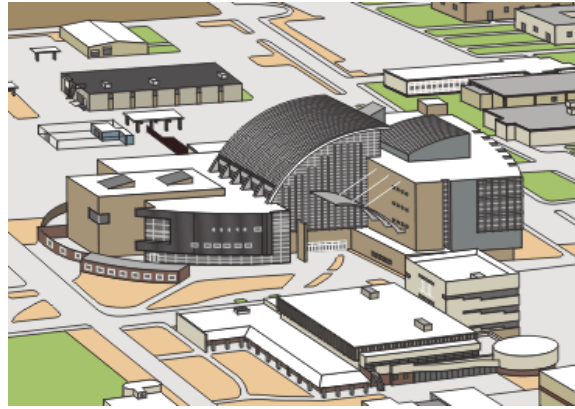
- Corrects limitations in existing .gif format.
- Generally results in smaller file sizes than .gif
- 8-bit .png files are currently recognized by 99+ percent of browsers.

### General Disadvantages:

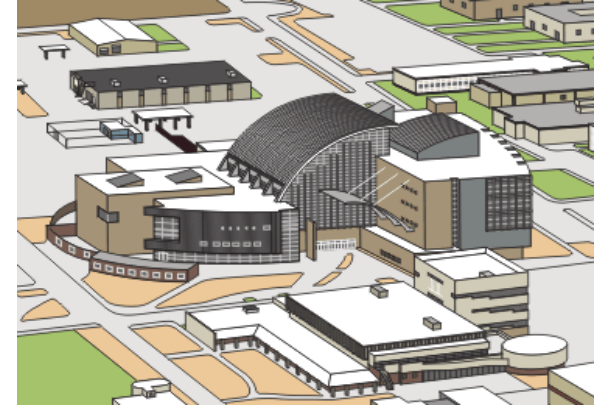
- 24-bit .png not fully supported (yet) by most Web browsers.
- Cannot be dynamically introduced into Flash files.



371 x 274 pixel .jpg file  
**92.2KB**



371 x 274 pixel .gif file  
**43.9KB**



371 x 274 pixel 8-bit .png file  
**34.7KB**

Utilizing .png format instead of .jpg will result in the above graphic loading roughly **62 percent faster** in a browser.

Institutional Connections (T1 lines) = 0.3 seconds and 57.5KB saved using .png

DSL/Cable Connections (Household) = 0.6 seconds and 57.5KB saved using .png

Dial-up Modems (56K) = 8.6 seconds and 57.5KB saved using .png

# got bandwidth?

## Five Graphics Tips

1. Using the Correct File Formats for the Job
2. Adjust JPG Compression Levels
3. Reduce GIF/PNG Color Bit Depths
4. Evaluate Need For Anti-Aliasing
5. Evaluate Need For Interlacing and Progressive Loads

## JPG Compression Levels

- Adjusting the compression levels of your images, weighing issues of quality and file size on a per-image basis, can result in dramatic reductions in your file sizes.



783 x 900 pixel .jpg, uncompressed

**358KB**



783 x 900 pixel .jpg, 25% compression

**37.3KB**

# got bandwidth?

## Five Graphics Tips

1. Using the Correct File Formats for the Job
2. Adjust JPG Compression Levels
3. Reduce GIF/PNG Color Bit Depths
4. Evaluate Need For Anti-Aliasing
5. Evaluate Need For Interlacing and Progressive Loads

## Color Bit Depths

- For simple graphics without a large number of colors/gradients, another nice solution for reducing the size of your graphics will be to reduce the number of bits used in the image export.

<u>Bit Depth</u>	<u>No. of Colors</u>	<u>Reduction in File Size**</u>
1	2	
2	4	
3	8	
4	16	60%
5	32	40%
6	64	25%
7	128	15%
8	256	N/A
24	16.8 million	N/A

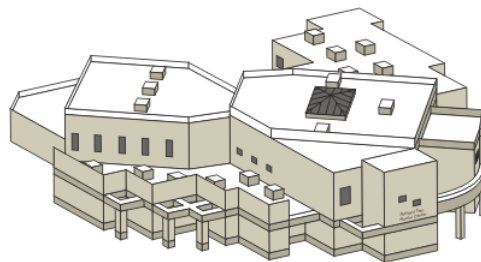
# got bandwidth?

## Five Graphics Tips

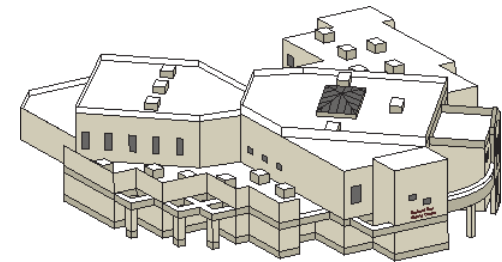
1. Using the Correct File Formats for the Job
2. Adjust JPG Compression Levels
3. Reduce GIF/PNG Color Bit Depths
4. Evaluate Need For Anti-Aliasing
5. Evaluate Need For Interlacing and Progressive Loads

## Anti-Aliasing

- Anti-aliasing is the process used to remove "jagged edges" or stair stepping in an image. Anti-aliasing smooths the diagonal lines by placing dots of an in-between tone in appropriate places.



400 x 214 pixel .gif  
anti-aliasing  
**22.8KB**



400 x 214 pixel .gif  
no anti-aliasing  
**5.9KB**

\*\* - anti-aliased image is 74.1% larger

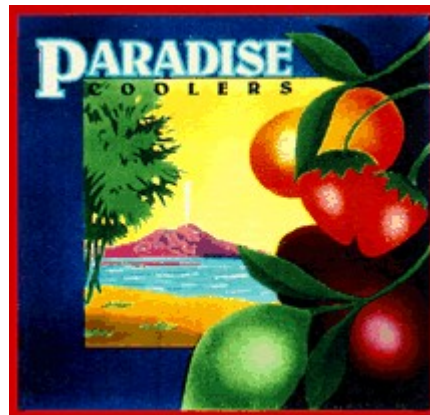
# got bandwidth?

## Five Graphics Tips

1. Using the Correct File Formats for the Job
2. Adjust JPG Compression Levels
3. Reduce GIF/PNG Color Bit Depths
4. Evaluate Need For Anti-Aliasing
5. Evaluate Need For Interlacing and Progressive Loads

## Interlacing and Progressive Downloads

- Interlacing (GIF/PNG) and progressive downloads (JPG) give web page visitors a gradually loading image to let them know that “something is coming.” However, the technique can also add 10-15% to an image’s file size

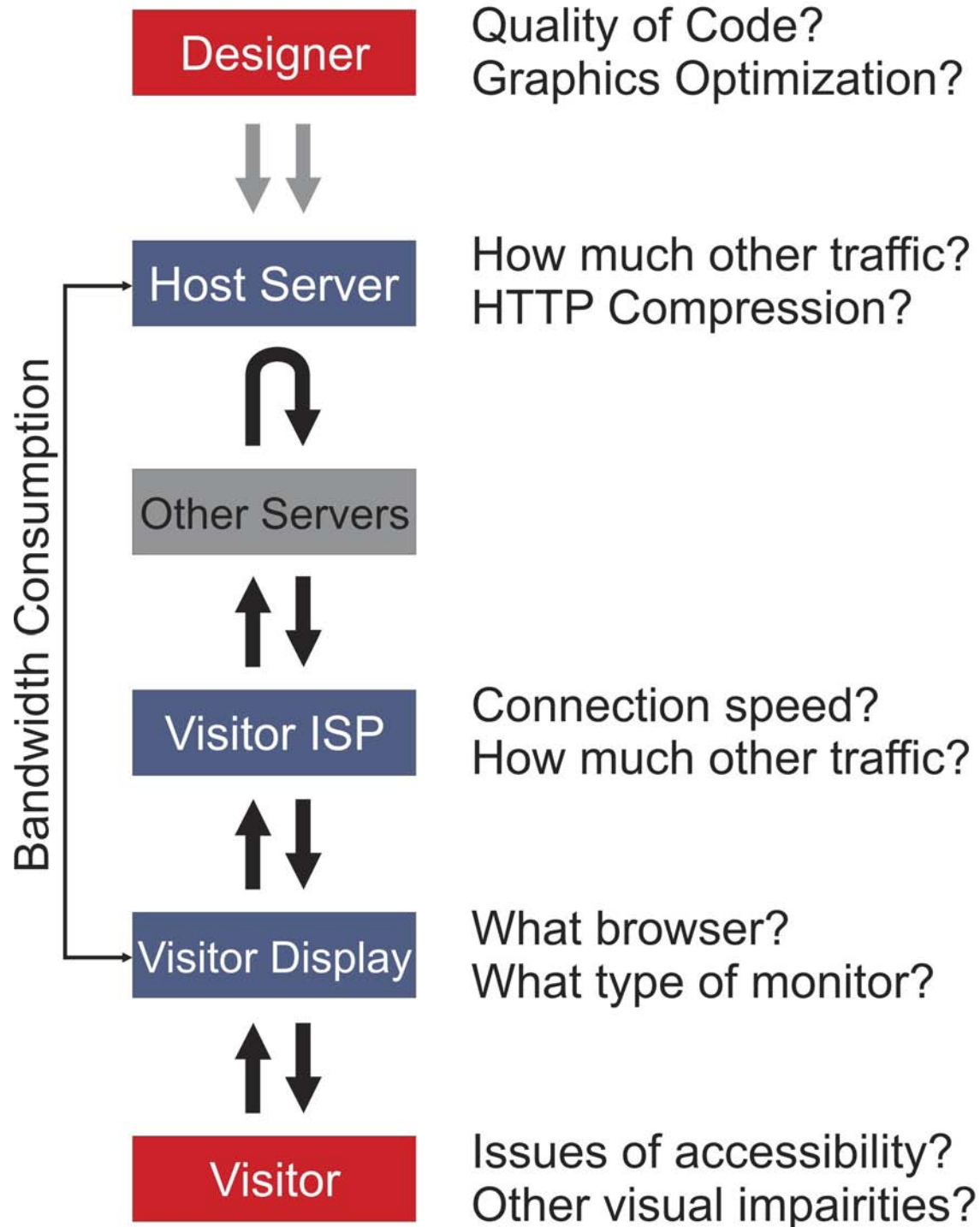


216 x 206 pixel .gif graphic  
24.4KB interlaced  
21.9KB non-interlaced

**10.2% smaller non-interlaced**

## 4. Free tools for optimizing web graphics.

1. **OptiPNG** - a PNG optimizer that recompresses image files to a smaller size, without losing any information. This program also converts external formats (BMP, GIF, PNM; TIFF support is coming up) to optimized PNG, and performs PNG integrity checks and corrections.  
<http://optipng.sourceforge.net/>
2. **PureJPEG** - an easy to use, high performance utility to remove unnecessary data from images you email or post on the net, without affecting the image quality whatsoever.  
[http://www.yafla.com/papers/purejpeg/filter\\_unnecessary\\_jpeg\\_info\\_such\\_as\\_exif.htm](http://www.yafla.com/papers/purejpeg/filter_unnecessary_jpeg_info_such_as_exif.htm)
3. **gif2png** - gif2png is a utility which converts images from Graphics Interchange Format (.gif) to free,  
<http://www.r1ch.net/stuff/gif2png/>
4. **Online JPEG Wizard Optimizer** – online .jpg optimization tool from Pegasus Imaging Corporation.  
<http://jpegwizard.com/>



“...but internet connections and computer processors are getting faster all the time...”

#### OTHER BENEFITS OF GRAPHICS OPTIMIZATION:

1. **Software Performance** – most of the software applications that we all use on a daily basis are filled with graphical files within their interface/display and tutorials. Optimizing the graphics which are included in the programs can make the programs run slightly faster, consuming less RAM.
2. **Cell Phones and PDAs** – most cell phones and PDAs do not possess the same RAM and internet connection speeds as the typical desktop or laptop computer. Reducing the size of graphics can improve the performance of these devices, not to mention increasing the file storage capacity for the storing of pictures and other data.
3. **File Storage** – unnecessarily large graphical files place more demand upon storage devices in-general. Optimized graphics help to ease this burden just a bit more, when combined with other compression technologies.



# mapformation™

## Mailing Address

mapformation, LLC

220 South Burns Avenue

Springfield, Minnesota, USA 56087

Telephone: 507-227-3338

Fax: 206-203-0411

General E-Mail Inquiries: [info@mapformation.com](mailto:info@mapformation.com)

URL: <http://www.mapformation.com>

<http://www.graphicsoptimization.com>