

## WIDESCREEN PROJECTION... THE SHAPE OF THINGS TO COME

**PETER H. PUTMAN, M.S., CTS**  
Principal, ROAM Consulting L.L.C.  
Doylestown, PA

The world of electronic imaging is going wide! Slowly but surely, electronic displays are adopting widescreen formats; from liquid-crystal display (LCD) and plasma TVs in the family room to portable DVD players, notebook and desktop computers, and even some new models of cell phones.

The same thing is happening in the world of projectors. The trend started with home theater models as high definition television and widescreen DVD playback became increasingly popular. Now, business and classroom projectors are going following suit, with the percentage of widescreen models steadily increasing each year.

Is it really time to upgrade to widescreen? Why are the standards for home theater and business/education projectors different? Where did these unusual screen resolutions come from? Is there an easy upgrade path to widescreen? All of these are excellent questions, and warrant closer investigation.

### THE MOVE AWAY FROM TRADITIONAL DISPLAY FORMATS

Currently, the most popular imaging format for everyday projection is the XGA (eXtended Graphics Adapter) standard. Its pixel count is 1024 horizontal pixels and 768 vertical pixels, and the ratio of width to height in the projected image is 1.33:1. Looking at it another way, a screen that measures 1.33 times wide as it does high is said to have a 4:3 aspect ratio.

The 4:3 aspect ratio goes back many decades to silent movies, and was later adopted for use by black and white television in the 1940s and color TV in the 1950s. It's also been the most popular shape for projected images using LCD technology for nearly two decades.

Early LCD projectors for the commercial AV market offered a native resolution of 640x480 pixels, conforming to the Video Graphics Adapter (VGA) standard. By the mid-1990s, LCD projectors with 800x600 pixels (Super Video Graphics Adapter, or SVGA) had appeared, followed shortly by XGA-resolution projectors. All three of these formats conform to the same 4:3 aspect ratio, as do higher-resolution projectors that offer 1400x1050 (SXGA+) and 1600x1200 (UXGA) resolution.

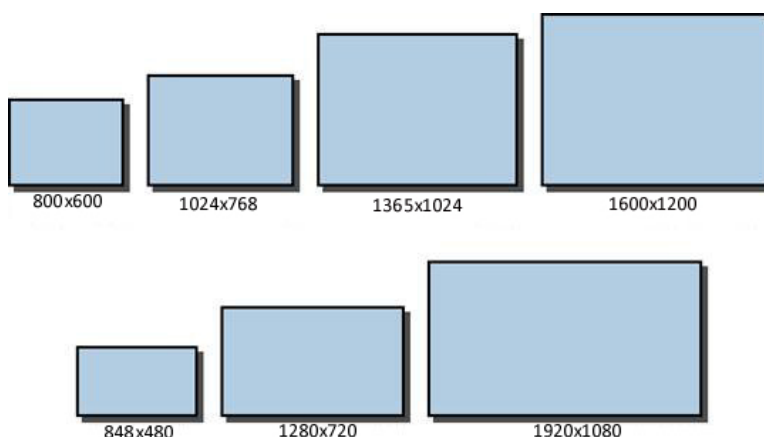


Figure 2. Until recently, business and education projectors always used 4:3 aspect ratios (top), while home theater projectors have moved to 16:9 widescreen ratios (bottom).

The 4:3 aspect ratio seems to be well entrenched! But other forces have been shaping the future of the AV industry over the past ten years. Digital TV broadcasting commenced in 1998, bringing not only digital versions of standard definition TV to the home, but introducing new high definition television formats as well, one of which contains 2 million pixels of resolution.

In the same time period, the computer industry underwent amazing growth, resulting in a new class of high-resolution LCD displays. Notebook computer prices were dropping in price almost as fast as their native pixel resolutions were increasing. And the Digital Video Interface (DVI) finally made it possible to connect a new generation of self-configuring “smart” monitors and projectors.

With the explosive growth of widescreen DVDs and HDTV, it was only a matter of time before computer screens also started taking on a wider shape. Today, it’s almost impossible to find a new notebook computer that doesn’t use a wide display, while 4:3 desktop monitors are fast becoming extinct.

## BEHIND THE NUMBERS

The worlds of video and computer displays first diverged after the introduction of VGA projectors almost two decades ago, and pixel counts for monitors and projectors have closely followed computer display standards since then. So when the time came for those displays to go wide, manufacturers simply expanded existing computer resolutions. (Ironically, the increasing popularity of widescreen video created the initial market demand for wider displays!)

As XGA resolution was the industry norm for business projectors, the logical step was to adopt a widescreen version of XGA for projection. Consequently, the 1024 horizontal pixels from the original XGA standard were expanded to 1280 and 1366 pixels, while vertical resolution remained at 768 pixels.

In recent years, projector manufacturers have adopted this new format for the business and education markets to match the latest resolutions of notebook LCD displays. (Notebook manufacturers recently expanded the original vertical pixel resolution of WXGA to 800 pixels.)

It should be clear that widescreen projection is here to stay, and should replace the traditional 4:3 screen shape sometime during the next decade. And not just for show: Widescreen imaging more closely approximates our normal field of view, which encompasses a 30-degree arc along a horizontal axis. That makes for a more immersive meeting and presentation experience.

Here’s how the WXGA and WUXGA formats compare to widescreen video standards:

**1280x800 pixels (Wide XGA)** –There are 1,024,000 pixels in a single WXGA frame, and the picture aspect ratio is 16:10. It is becoming a popular standard for portable and desktop projection. **Closest widescreen video format:** 1280x720 resolution with 921,600 pixels, formatted in a 16:9 aspect ratio.

The 1280x720 video format, although ideal for standard and high definition TV, has no relationship to any standard computer display format. Consequently, any notebook or desktop images displayed at this resolution require upconversion or downconversion and will not match the aspect ratio correctly.

**1920x1200 pixels (Wide UXGA)** – This is found primarily on higher-end notebooks and workstation computers. WUXGA is coming to market primarily in high-brightness installation projectors, and contains 2,304,000 pixels in each frame with a picture aspect ratio of 16:10. **Closest widescreen video format:** 1920x1080 resolution with 2,073,600 pixels, formatted in a 16:9 aspect ratio.

Although WUXGA has the same number of horizontal pixels as a 1080p projector, any relationship between them is coincidental - Wide UXGA is simply an expanded version of the 4:3 UXGA (1600x1200) graphics standard.



Figure 3. While both of these LCD projectors are considered “widescreen,” the Epson HomeCinema 8100 (left) is a 1080p 16:9 design for home use, while the Epson PowerLite 826W (right) is a WXGA 16:10 business/education product.

### WIDE XGA: THE SWEET SPOT

An argument can be made that WXGA is a “sweet spot” resolution for widescreen projection, as it can easily accommodate images formatted to a multitude of aspect ratios, including 4:3 and 16:9. In a presentation application, different image sizes or tiles can be fit into this 16:10 canvas much like a jigsaw puzzle, with numerous variations in position possible. The viewer sees more open windows that would otherwise be obscured in a 4:3 projected image.

#### Examples:

- 16:9 video (standard and high definition) fits the width of the 16:10 WXGA format, resulting in thin black bars along the top and bottom of the image. 720p HD content is mapped 1:1 from left to right, while 1080i and 1080p HD video is downscaled by 33%.
- XGA resolution images are sized 100% (1:1) and nearly fill the top and bottom of the screen, leaving thin blank pillars to the left and right. Standard definition video fills the same screen area.
- SXGA+ (1400x1050) images are downscaled by 23% to fill the screen top to bottom, leaving the same thin pillars on the left and right.
- Native WUXGA (1920x1200) images will downscale 33% on compatible WXGA projectors and snap exactly to the 16:10 picture size, leaving no sidebars at all.

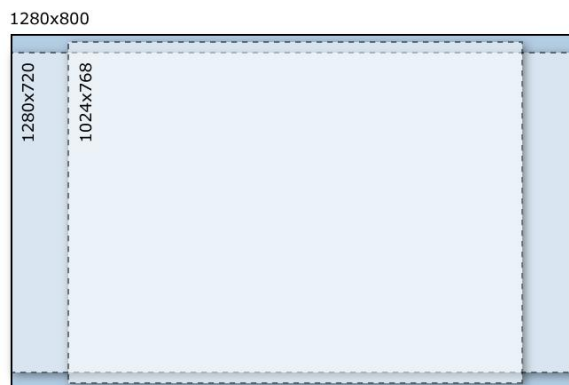


Figure 4. The WXGA 16:10 aspect ratio could be described as a “one size fits all” format – it accommodates a wide range of image sizes.

## PRESENTING IN WIDESCREEN

For instructors and presenters, moving from the traditional squarish 4:3 projection format to a widescreen format can be quite a challenge. Which is better – WXGA, or WUXGA? Actually, it’s not all that complicated to choose the correct format.

Remember - **WXGA** doesn’t add significantly more resolution to the image. It simply adds more width. That gives presenters more room for mixing text with photos or illustrations in Powerpoint. Or, presenters can combine a standard graphic, photo, or Powerpoint slide with one or two smaller, stacked images to one side. These images could also be simple graphics, photos, or low-resolution video.

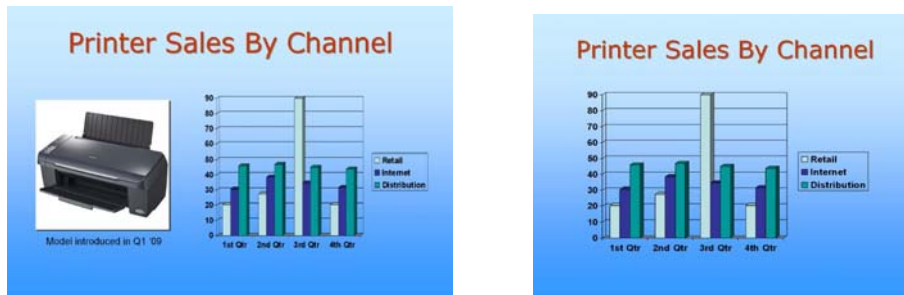


Figure 5. The WXGA format (left) provides more space for graphics and photos in presentations than XGA (right).

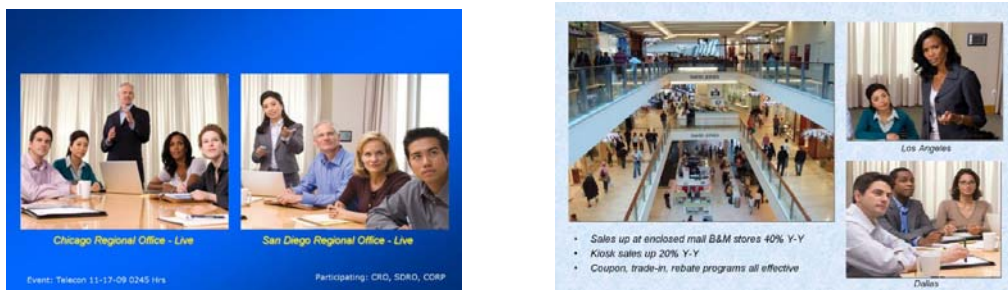


Figure 6. Both WXGA and WUXGA are ideal for multiple windows of video (left) or a mix of video windows with graphics (right).

In contrast, **WUXGA** is a significant upgrade as it adds considerable pixel detail (2.3 million pixels) to the widescreen image. It is well suited to tiled video and finely detailed graphic images or spreadsheets in applications such as large screen teleconferencing. WUXGA is also perfect for image tiling, soft-edge image blending, and super-wide applications, including extended desktops.

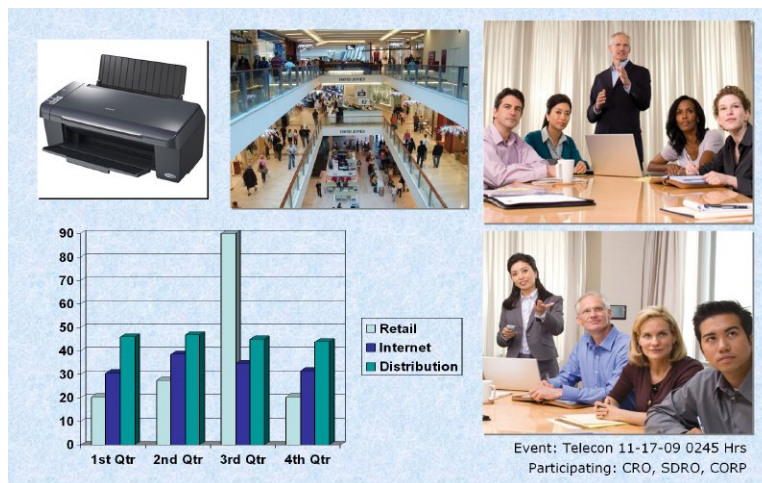


Figure 7. The WUXGA format has sufficient resolution to mix graphics, photos, and multiple windows of live video into a single projected image with lots of detail. It is well suited to projection on large screens.