A guide from Digital Signage Today

Digital Display Technology:
Learning the Basics of Digital Signage

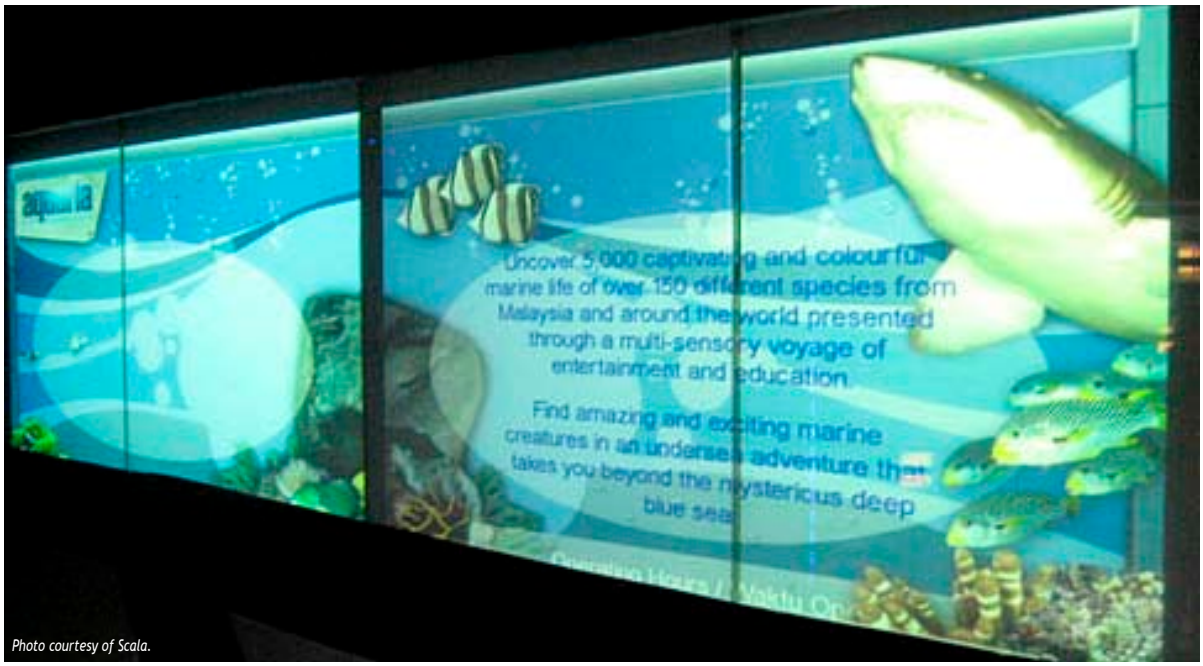

Photo courtesy of Scala.

INSIDE: Digital signage is emerging rapidly as a viable and effective communications tool. With that in mind, companies taking the first step in signage deployment will be much more successful on the playing field if they understand the basics of what digital media is and how it operates. For a crash course in digital signage, read on.

Developed and published by:

DigitalSignageToday.com

Sponsored by:

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Contents: Digital Display Technology

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Digital Signage Today, operated by Louisville, Ky.-based NetWorld Alliance, is the leading online publisher of news and information on the emerging world of digital signage, dynamic messaging and cutting-edge business communication technologies. The content, which is updated every business day and read by professionals around the world, is provided free of charge to readers.

Published by NetWorld Alliance

All photos courtesy of LG Electronics Inc. unless otherwise specified.
Written and edited by Travis K. Kircher, editor, SelfService.org
and DigitalSignageAssociation.org

Dick Good, CEO
Tom Harper, president and publisher
Bob Fincher, executive vice president and general manager, Technology Division
Joseph Grove, vice president and associate publisher

Introduction Signage 101

Imagine it's the first week in September and you're taking your 5-year-old son — chili dog in hand — to his first college football game. It's a special moment for your child. He's heard about football all of his life, usually from enthusiastic cousins who eagerly recount stories of exciting plays, last-minute touchdowns and bone-crunching tackles that left fans screaming in their seats. He's even seen a few games on television.

Today will be the first time he's ever experienced a game live in the stands. Football fan that you are, you can't wait to enthrall him with your moment-by-moment commentary explaining the various plays and strategies.

But by the end of the second quarter, you're ready to leave the stands and demand a refund.

It soon becomes obvious that the home team needs some serious help. Not only are they bad players in general, but they don't even seem to understand the basic rules of football. As soon as the quarterback gets his hands on the ball, he hugs it and starts running toward his own team's end zone instead of his opponent's. Even worse, his teammates tackle him and dance victoriously when the ball is yanked from his arms. When the opposing team's quarterback catches the ball, the home team makes it a point to tackle every other player but the quarterback. The game is an absolute disaster and, ultimately, a waste of money.

Travis K. Kircher,
editor,
SelfService.org and DigitalSignageAssociation.org

It's an important lesson learned: You can't compete effectively if you don't understand the rules of the game. That goes for sports, business and, not surprisingly, digital signage deployments.

You can't compete effectively if you don't understand the rules of the game. That goes for sports, business and, not surprisingly, digital signage deployments.

It's no secret in today's business landscape that digital signage is emerging rapidly as one of the most effective and eye-catching communications mediums on the market. Spend time with any marketing professional and you'll quickly feel the excitement generated around digital technology. The enthusiasm is electric. Convinced by the vibrant colors and sharp resolution that a digital display provides, your CEO is ready to deploy dozens of displays under your company's banner.

Introduction: Signage 101

But before you sign on the dotted line and roll out the cash, you need to understand exactly what digital signage is and how it works. What kind of display will best meet your needs: plasma or LCD? What are the pros and cons of each? How will digital technology change in the next five, 10 or 20 years? What about terminology — what is the language of digital technology?

Far too many signage deployers — like the confused football players — launch a huge project without having a firm grasp on the basics. More often than not, these misguided efforts wind up costing the deployer lots in terms of sunk cost. This is unfortunate, particularly when the mistakes could have been avoided had the deployer only taken the time to learn some basic facts about the business.

That's what this guide is about. By the time you've finished reading, you'll understand enough to know where digital signage has been and where it's going. You'll also know how to make smart purchasing decisions when it comes to your display. Think of it as Digital Signage 101.

We'd like to thank LG Electronics Inc., whose kind sponsorship of this guide enables us to bring it to you at no cost.

Chapter 1: What is LCD technology?

In a color LCD panel, each pixel is made up of three liquid crystal cells. Light passing through the filtered cells creates the colors seen on the LCD.

Photo courtesy of ADFLOW.

Before we get into the various types of digital displays on the market, it probably would be advantageous for us to define exactly what we mean by the phrase "digital signage."

Digital signage is a form of out-of-home advertising that appears on some type of digital display — most often a plasma screen or LCD. The type of content on the signage can vary. It may take the form of colorful slides that are flashed on the screen in 10-second intervals. It may be a list of text that is updated regularly, such as a roster of arriving or departing flights displayed in an airport lobby.

The content can consist of scrolling stock prices, a live CNN news feed or even dramatic, full-motion video.

Whatever the content, the purpose of digital signage is the same: It's trying to communicate something to the viewer. Digital signage is not just a flashy way for the consumer to "watch TV." It educates, sells a product or conveys an idea.

A digital signage system generally consists of a number of components. The first component is the hardware, which is made up of the display (again, typically an LCD or plasma screen) and some sort of signage

player device that stores the content and feeds it to the display. Then there's the software — the set of instructions that governs the entire system.

The network — the final component — is optional but highly recommended, especially for large-scale signage deployments that cover a wide area that might include multiple cities, states or even continents. A network is an effective empowerment tool that enables deployers to remotely manage their digital displays without leaving the office. Signage content can be replaced, deleted or updated at the click of a mouse. When individual displays malfunction, alerts can be sent automatically to the network administrator, prompting the deployer to conduct a remote diagnostic (and sometimes repair the display) from hundreds of miles away.

That's the basis of digital signage in a nutshell.

The first questions that might be running through your mind — and the mind of any prospective signage deployer — likely revolve around the display itself. After all, the digital display is the most visible and dramatically striking component of the whole ensemble. It's the coolest to look at. It also — in most cases — represents the most significant portion of the initial investment.

"LCDs are the display of choice if you plan on featuring a lot of static content … with an LCD, you're not going to have the image burn that you would see on a plasma."

— Ron Snaidauf, vice president, commercial products, LG Electronics USA

Faced with a choice between two displays, which way should deployers go? Do they want to purchase an LCD or a plasma display? That's the question we'll examine in the next two chapters. In the first chapter, we'll take a close look at LCD technology to determine its strengths and weaknesses.

How it works

Even if you've never heard of LCDs — or liquid crystal displays — chances are you use them on a regular basis. They're featured in a wide variety of products, from laptop computers to cell phones to GPS devices. Within the past five years, LCDs have emerged as a viable option for digital signage deployers.

So how do they work?

One of the primary components of LCDs are — not surprisingly — liquid crystals. According to an article on PCWorld.com, liquid crystals are "liquid chemicals whose molecules can

be aligned precisely when subjected to electrical fields — much in the way metal shavings line up in the field of a magnet. When properly aligned, the liquid crystals allow light to pass through."

An LCD consists of a fluorescent light — or backlight — that shines through a layer of liquid crystals located in pixels sandwiched between two polarized filters. When electrical current is applied to the liquid crystals at various currents, they combine with colored filters to make an image.

"In a color LCD panel, each pixel is made up of three liquid crystal cells," the article said. "Each of those three cells is fronted by a red, green or blue filter. Light passing through the filtered cells creates the colors you see on the LCD. Occasionally the mechanism that sends the electrical current to one or more pixels fails; in those instances you'll see a completely dark, 'bad' pixel."

Static content

By now you should have a basic understanding of the inner workings of a liquid crystal display. Now that you can grasp some of the technical aspects, it's important to recognize both the benefits and the limitations of the technology. In what cases are LCDs superior to plasma? Where do they fall short? Only when you fully understand how LCDs perform in the real world will you be able to determine if an LCD is right for your purposes.

When purchasing a digital display, one of the first terms one needs to come to grips with is "burn-in."

Burn-in — also referred to as "image retention," "ghosting" and "image shadowing" — is the dreaded phrase that no digital signage operator wants to hear. It usually occurs on displays that continuously run static content, such as logos, banners, crawling text and similar graphics that remain on the screen for long periods of time. When the picture changes and the static content is removed, a faint "ghost" or "shadow" of the content may remain. If you've ever used a desktop computer, you're probably familiar with screensavers. Shortly after desktop computers became popular, screensavers were developed in an effort to curb the effects of burn-in by directing the computer to replace static content with animated moving content when a monitor had been idle for a pre-specified period of time.

Burn-in not only can be distracting, but it can also decrease the effectiveness of your digital signage. Signage is supposed to draw the eye because it is clear, sharp and brilliant. No one wants to look at a display that is difficult to read because it's still displaying the faint traces of last week's

stock performances. That's why it's vital that signage deployers avoid burn-in at all costs.

Burn-in typically affects any phosphor-based monitor or display, including cathode ray tubes (CRTs) and — particularly of interest to those who plan on deploying digital signage — plasma screens.

LCDs, on the other hand, are much more effective at avoiding the effects of burn-in.

"LCDs are the display of choice if you plan on featuring a lot of static content," said Ron Snaidauf, vice president, commercial products, LG Electronics USA. "Corporate logos, crawls featuring stock performances, lists of arriving or departing flights — all of these are examples of static content that can create significant burn-in issues. With an LCD, you're not going to have the image burn that you would see on a plasma."

Bill Gerba, CEO of Fort Lauderdale, Fla.-based Wirespring Technologies Inc., agrees.

"(LCDs) don't have any kind of burn-in problem," Gerba said. "A plasma is kind of like a CRT. If you leave the same image on the screen for a while, it has the potential to burn in. You get a ghosted image any time you try to show something else. LCD doesn't suffer that."

Smaller screen sizes

Whether you're watching television, working on a computer or staring at a digital display, screen size is important. The general perception (though for business and logistics reasons this is not always the case) is that bigger is better, but there is a wide variety of choices when it comes to size. A digital screen can be as small as a 1.25-inch mobile-phone display or as large as a 108-inch plasma screen.

In the past, LCDs have been characterized as the display of choice when smaller screen sizes are required.

"With LCD, you're going to have smaller screen sizes than what you would get with a plasma," Snaidauf said. "If you wanted something with a screen size lower than 20 or 30 inches, you're going to see that an LCD will fit the bill where plasma technologies don't exist."

Conversely, plasma displays traditionally have prevailed when it comes to large screen sizes.

"The plasma guys are trying to go bigger because they still have an edge there on the very large displays," said Sean Moran, president of the Out-of-Home Media Networks business unit in the Technicolor services division of Paris-based Thomson.

But the plasma screen monopoly may not last forever. Moran says he

is witnessing a gradual increase in LCD screen sizes; in fact, he recently attended a conference where a 100-inch LCD was showcased.

"Of course these are in small quantities, but if they're going there, I think they're probably going to take this market away," Moran said. "So that's had a real negative impact on the plasma program."

Price tags

One significant downside to choosing LCDs historically has been cost. As a general rule, LCDs are more expensive than plasma screens. As Scott Koller, senior vice president of sales and marketing for Minneapolis, Minn.-based Wireless Ronin Technologies Inc. says, much of the expense stems from the quality-control measures necessary to ensure that reliable LCDs are rolling off the assembly line.

"There was an awful lot of fallout in the manufacturing process," Koller said. "They have issues with moving the glass through the manufacturing process and coming out of it without losing the quality of the product, so it was more expensive to make."

According to an article that appeared on ConsumerReports.org in June 2007, a 46-inch LCD display with a good record of reliability likely will cost at least $3,000, while a 50-inch plasma screen from an established brand may run $2,000 to $2,500.

But experts say improvements in the manufacturing process, combined with an increasing number of LCDs on the market, gradually is driving down the price of LCDs to become more competitive with plasma screens.

"Originally, the only flat-screen technology for large screens was plasma, so there was no choice," Gerba said. "If you were doing a big in-store project, you were going to be using plasma screens. Then LCD came on the market, but it was incredibly expensive; it might be two or three times the cost of a plasma."

But as consumer interest in LCD picked up, the manufacturing capacity increased dramatically.

"It dropped the price and, all of a sudden, you were at a point where LCDs were coming much closer in price to plasma screens," Gerba said. "So all of a sudden their advantages — namely the longer lifetime and the lack of any kind of burn-in potential — started to make them a more clear choice for any kind of digital signage."

The cost differentiation between plasmas and LCDs has almost disappeared, Koller says.

An LCD market?

Experts say the gradual drop in cost has resulted in a market that leans heavily toward LCDs.

Ryan Cahoy, vice president of sales and marketing for Toronto-based Rise Vision Inc., estimates that 95 percent of the digital signage projects his company installs in financial institutions or universities use LCDs rather than plasma screens.

"The prices have come down a lot," Cahoy said. "Where you're doing more static-type content, LCD is what we call a much more durable technology."

Koller takes an even stronger stance.

"We will probably never quote a plasma," Koller said. "We haven't quoted a plasma in a year. Unless a client wants something above 46 or 50 inches, which is as high as LCD goes, we won't quote a plasma."

But Snaidauf takes a more moderate approach. In the complex competitive landscape, he says he feels there is room for both display types.

"We honestly see a lot of people using both technologies," Snaidauf said. "When you look at some of the market projections from the research companies regarding the use of plasma screens in the commercial market space, plasma has rebounded in the past couple of months. Cost is still a factor for LCD over plasma, so a lot of people, because of that cost difference, will continue to use plasma even though they are aware of the risks. But for most signage, I think the trend is moving more toward people going with LCD."

Applications for LCDs

So when it comes right down to it, what specific applications make the best fit for LCDs?

Given the absence of any significant burn-in issues relative to plasma screens, it's advantageous to remember this rule: If you plan on including static content on your digital displays, it's probably best to use LCDs. One example of such an application would be a digital menu board in a fast-food restaurant. Such a menu board might hang over the cashier stations and list the individual food items offered, along with the prices of those items. Although prices may change from time to time and the individual items listed might change as the restaurant customizes its advertising for different meals, the rows of text likely will appear in the same general areas. After several weeks, this is likely to create a burn-in issue for plasma screens. In this instance, an LCD would be a better fit.

That's one example of static content that could damage a plasma screen over time. Other examples include flight schedules on airport displays, team listings on digital scoreboards, financial tickers, news crawls and company logos that remain on the display at all times.

Another important application where LCDs trump plasma screens is for digital displays in fast-food drive-thru lanes. In areas of high ambient light, the image from a plasma screen typically will get washed out. Ambient light — such as direct sunlight in the outdoors — also has a tendency to create a reflective glare on the front of plasma screens. LCDs avoid this problem because they are considered emissive displays, meaning that they use a fluorescent backlight to operate.

As a general rule, LCDs have a greater longevity, are lighter and are able to handle static content better than plasma screens. But as we'll see in the next chapter, plasma screens have their own unique advantages.

Chapter 2: The thing about plasmas

After LCDs, plasma screens make up the second-most popular display choice when it comes to digital signage. Although plasma screens are not the most popular choice among consumers, that doesn't mean plasma technology is inferior. As you'll discover quickly over the course of this chapter, plasma screens have their own advantages over LCDs. As with anything else, the performance of the display should be evaluated with regard to the type of application it's being used for.

Before going any further, let's examine briefly how plasma technology works.

Plasma TVs are similar to LCDs in one respect: Small pixels sandwiched between two layers of gas are heated by electrical current. The end result is that the pixels create colors based on the intensity of the current.

There is one significant difference, however: the contents of the pixels. On an LCD, the pixels are filled with liquid crystals. A plasma screen uses gas plasma. That means plasma

The biggest difference between LCD and plasma is the design of the pixels.
Photo courtesy of Scala.

screens can do without one key component that LCDs require.

"LCD panels need the backlight to create an image because liquid crystals can't create light," said an article on the Australian online edition of PCWorld.com. "However, plasmas don't have a backlight because the process of charging a sub-pixel creates light."

Now that you understand the basics of how a plasma screen works, we can delve into the types of advantages a plasma screen can bring to the table.

Channeling full motion

Most industry analysts agree that full-motion video appears much more cinematic on a plasma screen than on an LCD. The reason lies in the above-mentioned fact that plasmas require no backlight.

"The primary difference is that plasma is what is called an 'emissive display,'" said Bill Gerba, CEO of Fort Lauderdale, Fla.-based WireSpring Technologies Inc. "Every pixel makes its own light and is sending its own light out. As a consequence, the colors are very vibrant. If a pixel is black, there's no light coming out of it, so it's a true black. With LCD, on the other hand, there's a film that basically makes the different colors, but there's a backlight behind it. To make black, for example, the pixel gets filled in so that it doesn't let the light from the backlight pass through. Consequently, the big shortcoming of the LCD is that blacks aren't as black — colors aren't as vibrant — as they are on plasmas."

"The primary difference is that plasma is what is called an 'emissive display.' Every pixel makes its own light and is sending its own light out. As a consequence, the colors are very vibrant."

— Bill Gerba, CEO of WireSpring Technologies Inc.

Ron Snaidauf, vice president, commercial products, LG Electronics USA, offers an opinion that corroborates Gerba's.

"Plasmas have a higher contrast ratio, better blacks, better color and overall depth than what you're going to get with an LCD," Snaidauf said. "So if you're going to be doing something where you're always changing the images and you're not going to have anything static there, that's going to be something that a plasma will excel at."

In addition, plasma screens generally have a higher refresh rate, meaning that they are able to handle fast-moving video better than LCDs. That, plus the added vibrancy and color

depth of a plasma screen, generally makes it the top choice of consumers who want to use it simply for in-home entertainment purposes.

"For home theater, many prefer plasma screens," said Bob House, COO at Tempe, Ariz.-based NORVISION Inc. "The picture is a little better than on LCDs, and fast motion, such as a baseball flying at 100 mph, is clearer. However, LCD technology is catching up fast."

"Personally, I prefer plasma to LCDs" for home theater purposes, said Jimmy Dun, vice president of business development for Fremont, Calif.-based Dynasign Corp. "In terms of moving video, plasma obviously has much more superior quality in terms of colors and speed. It yields much better video quality."

Prices and sizes

Another advantage of plasma screens over LCDs is the overall price tag. Recall that in the last chapter, we stated that a 46-inch LCD display may cost $3,000 or more, while a 50-inch plasma screen may run from $2,000 to $2,500. Because plasma screens are easier to manufacture, their cost is lower relative to LCDs. As noted in the previous chapter, that differential is likely to become less significant as LCD technology improves.

Plasma screens also are facing growing competition from the LCD market in the area of screen size. Plasmas generally have held a monopoly on screens in sizes greater than 50 inches, but LCDs slowly are making inroads onto that playing field. While the largest digital displays on record are plasma screens, companies are beginning to offer LCD screens in the 52-, 65-, 70- and even 100-inch range, albeit for higher prices.

Beating back the burn-in beast

No technology is completely infallible. There's a storm cloud to every silver lining and it's no different for plasma-screens. Like anything else, plasma screen technology has its deficiencies.

As stated in the previous chapter, one area where plasmas come up short is in the realm of static content. While plasmas excel at displaying full-motion video, they are more susceptible to the effects of burn-in than LCDs are.

The reason for that susceptibility lies in the components that make up a plasma screen. According to a fact sheet on the Panasonic Corporation of North America Web site, burn-in is caused by "an uneven aging of the phosphors in a display device."

As the site explains, actions can be taken to avoid burn-in on a plasma screen.

"Use common sense when it comes to your plasma TV," the site said. "Don't pause video games or watch TV stations with station logos onscreen for long periods of time, and use one of the many display calibration DVDs available today for properly setting brightness and contrast. The rule of thumb: If you don't worry about your traditional tube TV, you don't have to worry about a Panasonic plasma TV."

That's comforting advice for casual TV watchers, but digital signage typically runs for several hours at a stretch — sometimes even 24 hours a day. And in most cases, signage is dealing with at least some static content — usually a considerable amount of it. Digital signage deployers have to pay closer attention to burn-in effects than the typical consumer watching television for the standard two hours a day.

While most experts agree that plasma screens still need to make progress in the area of burn-in mitigation, some proponents of plasma technology argue that plasma screens have come a long way toward minimizing the effects of burn-in.

"Burn-in (or premature aging of the phosphor) was a concern in the first-generation plasmas years ago, but this problem has long since been drastically reduced — particularly now that we're in the 10th generation of plasma technology," said Andrew Nelkin, CEO of Secaucus, N.J.-based Panasonic Professional Display Company. "While it's true that any TV can retain images, plasma is on par with CRTs that were used in the signage business for decades."

Proponents like Nelkin point to mitigation techniques such as screen savers, pixel shifting and brightness level adjustments as front-line defenses against burn-in.

The reliability factor

Another perceived shortcoming for plasma screens is that they're not as reliable as LCDs. Some experts argue that plasmas generally have a shorter life span than LCDs and suffer more malfunctions.

"LCD is just a much more dependable, robust technology," said Ryan Cahoy, vice president of sales and marketing for Toronto-based Rise Vision Inc.

House says his company provides solutions for digital signage systems that use LCDs, as well as those that use plasma screens. But he says he has greater confidence in the longevity of LCDs.

"NORVISION prefers LCD displays due to their low power consumption and long life-cycle," House said. "Plasma (screens) have their use, too, because of lower cost and larger panel sizes, but reliability is less compared to

LCD, and we always sell five-year, on-site extended warranties on plasma panels that are used for critical digital signage systems."

But some data seems to undercut the perception that plasma screens are less dependable than their digital cousins. A study that appeared in the December 2007 issue of Consumer Reports attempted to determine which digital display type — plasma screen or LCD — experienced more technical issues over a three-year period.

"Consumer Reports found little difference between the average repair rate for LCD and plasma TVs — overall, they both had a 3 percent repair rate," said a news release issued by Consumer Reports about the study. "Among the tiny percentage of sets with problems, most repairs were free, presumably because they were covered by the manufacturer's standard warranty. The few respondents who paid out of pocket for repairs spent an average of $264 on LCD sets and $395 on plasma."

Making the right choice

To summarize what we've learned in the past two chapters, the type of display you'll want to choose for your digital signage system will depend entirely on how that system will be used. Plasma screens and LCDs both are powerful technologies. One is not superior to the other, but they have unique strengths and weaknesses that make them optimum choices for some signage applications, but less appropriate for others.

What are you trying to accomplish with your digital signage system? How will it be used? Is it meant to communicate with consumers? Educate them? Entertain them? How long will content segments be? Will the signage display a lot of static content, or will it mostly be full-motion video?

Then there's the environment where the displays will be. Will they be placed in areas with a lot of ambient light (e.g., outdoors), or will they make their homes in dimly lit corners?

As we'll see in Chapter 4, most experts agree that the technology is not nearly as important as the content. A word of warning: Some deployers walk into a showroom and are completely bowled over by a new and impressive digital display with all sorts of bells and whistles. Eager to include the same features in their own deployments, they'll fork over copious amounts of cash to purchase the displays, only to discover months later that those same bells and whistles — though still impressive — aren't helping them convey their message. Worse yet, in some cases, the features may wind up distracting the consumer from the content.

Chapter 2: The thing about plasmas

It's an important lesson learned: Before you spend a single penny on the display — or any component of your digital signage system, for that matter — zero in on the message you plan to send the viewer. Only when you have a grasp of the message will you be able to determine which display type will be the best at conveying it.

With that in mind, there are some general rules to remember when selecting the display. If you plan on using a lot of static content in areas of high ambient light, you'll likely be better off if you go with an LCD. If full-motion video is a critical part of your presentation — particularly high-speed video — then a plasma screen probably will give you a slight edge.

Of course, there are exceptions to the rule. Just remember: The message is the thing.

Chapter 3: Coming up next

Industry experts agree that interactivity will become an increasingly important feature on digital signage.
Photo courtesy of Scala.

One of the great things about being on the forefront of a new technology like digital signage is that things change constantly. Screen sizes are getting bigger than they've ever been before — and smaller, too. Picture quality is improving rapidly as resolution goes up. Even as you read this, display manufacturers are working overtime to find new ways to eliminate color saturation, shorten pixel response time and curb the power consumption of their individual products.

That's exciting in itself, but what's really intriguing are the brand-new digital technologies that are jockeying into position. Technologies such as organic light-emitting diodes, field emission display and electronic paper soon may be just as commonplace as plasma and LCD.

So what lies ahead for the realm of digital technology? Analysts say that can be tough to predict, but we can learn some things from the latest trends. This chapter will take a brief look at some of the most recent developments.

Projection

In addition to using the more traditional plasma screens and LCD displays, digital signage can be projected theater-style onto various media via front- or rear-projection TV.

The advantages of projection TVs are obvious. They can provide a much larger picture than conventional CRTs can. Projection TVs also can suit a number of rooms and budgets. In a sense, they act as a sort of portable theater.

"They are still bigger and bulkier overall, from just a physical dimension," said Ron Snaidauf, vice president, commercial products, LG Electronics USA "But the weight on a projection TV has now gotten down to a point where it's pretty similar to what you'll see on an LCD or a plasma."

The interesting thing about projection techniques TV is that the image can be displayed on a variety of media. Instead of simply displaying the image on a conventional blank screen, some manufacturers are experimenting with TVs that can beam the picture onto more creative backdrops.

"You can have displays on a window," said Jimmy Dun, vice president of business development for Fremont, Calif.-based Dynasign Corp. "The most interesting kind of display I've seen is using a fog, and a projector projects onto the fog. Even better, they made this fog-based screen interactive and touchable."

Many believe this experimentation may be the precursor to widespread use of holographic projection. Others choose to temper their expectations.

"The programs we have seen with holographic projection have still been ones where you're really restricted to very specific viewing angles in order to get the experience," said Sean Moran, president of the Out-of-Home Media Networks business unit in the Technicolor services division of Paris-based Thomson. "I haven't seen a holographic program that I thought was something that made it beyond a trade show. Quite frankly, if you come across one, let us know. I'd love to take a look at it."

"If deployers can recognize these new technologies as they develop, harness their power and meld them to somehow meet consumer demand, they'll be in a very enviable position as the future unfolds."

— Ron Snaidauf, vice president, commercial products, LG Electronics USA

"I think we're a long time away from anything like that," said Bill Gerba, CEO of Fort Lauderdale, Fla.-based WireSpring Technologies Inc. "I would say in the next five years, you're going to see relatively few real differences in the display technologies. There's a lot of stuff waiting in the wings."

IPTV

Internet Protocol Television refers to digital programming that is delivered to the viewer via computer networks. In other words, instead of the network programming of today, which is broadcast through the airwaves, IPTV would be streamed online through the Internet.

The technology was brought to the forefront recently during the Writers Guild of America strike, which began in late 2007. In the time leading up to that strike, the major broadcast networks had been offering episodes of their flagship shows (shows such as "Lost," "Desperate Housewives" and "Heroes") online, free of charge, as long as the user was willing to sit through brief advertisements. Screenwriters argued that the new content-delivery method provided a way for the networks to circumvent the payment of writers' royalty fees.

Controversies aside, digital signage deployers would have a lot to gain from fast, reliable IPTV technology.

Most signage systems are structured so that the content is forwarded through the network to the digital signage player, which in turn sends the content to the display. IPTV would enable the system to bypass the player and feed straight into the display in a live, streaming feed. Such technology — when perfected — essentially would enable deployers to run their own live streaming network online that could pump content to all of the deployer's digital displays worldwide.

In a sense, that capability is available, but the picture quality is sorely limited.

"The Internet is not really an efficient vehicle for IPTV," Dun said. "While you can broadcast low-quality, low-resolution channels, if you're looking at high-quality streaming in real time — that demands bandwidth. The Internet structure is great nowadays, but it's not ready to handle that kind of traffic yet."

Interactivity and targeted advertising

If there's one thing industry experts agree on, it's that interactivity — the ability of the consumer to manipulate the digital display — will become an increasingly important feature on digital signage.

Digital touchscreens and interactive kiosks are all around us, ranging

from the self-service airport check-in kiosks to touch-activated wayfinder displays in colleges and universities. But Tim Buchholz, senior vice president of corporate communications for Point of Purchase Advertising International, an international trade association based in Washington, D.C., says he expects those displays increasingly to target customers based on their interactive choices.

In fact, he says he believes the time may come when a display will be able to size up a prospective customer as soon as he walks into the room.

"I also think there will be interactive devices that will be able to understand the demographics of a particular individual who might be passing by a digital sign and be able to serve up information very targeted to the demographic of that individual," Buchholz said. "Facial recognition and stuff like that, I think, will be quite advanced by that time, and they'll be able to send out demographic information and basically have it served up on demand without that person's interaction with it at all, except their being in proximity to the display."

He says having this ability will be critical for marketers in the future because today's consumer is becoming very adept at ignoring random advertising.

"If you're sending a message out to a very broad audience, there's a good chance that, for a fairly hefty percentage of the people, it won't resonate with them," he said.

OLEDs

Put reliable OLED technology on everyone's Christmas wish list, from digital signage deployers all the way down to the devoted couch potato who wants better picture quality on his big-screen TV.

In theory, OLED display technology would use the electroluminescent properties of organic compounds to provide an image that would consume less power than a plasma screen or LCD.

"OLEDs — organic LEDs — are basically light-emitting diodes," Gerba said. "They're little, tiny components that actually emit light. Because of that, they kind of combine the best elements of plasma and LCD."

OLEDs are essentially like a plasma, with vibrant color, true black and high contrast, Gerba added.

"But like an LCD, they don't suffer any kind of burn-in problems," he said. "Right now, they are phenomenally expensive, and they're made in very small screen sizes, but obviously if consumer demand wills it, that will change."

Many experts believe OLED technology could be used to create cardboard-thin portable displays that could be rolled up like a towel. It also might pave the way for displays that could be stitched into clothing.

But many in the industry aren't holding their breath.

"Honestly, OLED has been around for a long time, and people have been projecting that they would have this technology in larger screen sizes," Snaidauf said. "But from a technology and cost standpoint, it just hasn't gotten there. For the small screen stuff — maybe for under 10 inches — OLED has a lot of strengths and a lot of good positioning there, but to get a 42-inch or 52-inch OLED, I don't know that it's going to happen. They just haven't gotten to that scale."

FEDs

Another display technology that someday might give LCDs and plasma screens a run for their money is the field emission display.

According to an online fact sheet published by Sharp Corp., the FED shares some of the same attributes of a CRT, but its thickness is measured in millimeters. In the case of an FED, the single electron gun is replaced by an array of tiny metal tips called nanotubes, which emit electrons that produce the image on the screen.

"An FED projects pictures using the same light-emitting principle as CRTs," the online fact sheet said. "An FED removes electrons from the cathode and makes them collide with fluorescent material applied to the cathode, thus emitting light. While the cathode of a CRT uses a point electron source, an FED uses a surface electron source. Six-inch color FED panels have already been manufactured, and research and development on 10-inch FEDs is proceeding very rapidly. When compared with (thin film transistor) LCDs, FEDs offer a superior viewing angle (160 degrees both vertically and horizontally) and are several microseconds quicker in response speed."

The advantages? An energy-efficient digital display with image quality that mimics a CRT.

Screen sizes

Much has been written in this guide thus far about the importance of screen size. Currently, the world's largest digital display is a 108-inch LCD developed by Sharp Electronics Corp. No doubt display manufacturers will continue to up the ante as time goes on, but Snaidauf believes signage deployers should think twice before they make the assumption that bigger is always better.

"When you stop and think about it, any LCD or plasma screen that is 100 inches or greater in size is going to be tremendously difficult to get into business environments," Snaidauf said. "How many elevators can handle that size of a piece of equipment coming into it? I don't know of many that are designed that large. So while everybody talks about these large screen sizes, in some regards, you have physical limitations with regard to infrastructure within buildings that can accommodate that type of size to get it to the deployment point. Yeah, if you go into a stadium, sure you've got big loading docks to get in. But in a normal office building? No way."

Snaidauf doesn't downplay the effectiveness of these super-sized screens in certain applications, but he suggests that deployers think through the logistics thoroughly before purchasing a 108-inch screen.

Screen size also takes on legislative significance when it comes to interactivity. Like anything else, an interactive touchscreen must be compliant with the Americans With Disabilities Act. That means it should be accessible to anyone traveling in a wheelchair.

"Finding the right screen size is kind of the Holy Grail right now," Snaidauf said. "It's all over the board. When you get into the really large sizes, you've got to think about someone getting up close to interact with it. You've got the requirements of the ADA — those folks have to access the screen, as well. If you have too large of a screen, you generally have to have that higher up so that it's not sitting as close to the bottom of the floor. But if you have it up too high, people in wheelchairs won't be able to access the screen because it's out of their reach."

Electronic paper

One display technology that could be of particular interest to bookworms is electronic paper. At the time of this writing, electronic paper is just beginning to make inroads into mainstream society through devices such as Amazon.com's Kindle — a wireless portable reading device that can display text from more than 90,000 books, blogs, newspapers and magazines.

One of the core strengths of the device, according to Amazon.com, is that the display "provides a sharp, high-resolution screen that looks and reads like real paper."

That's the logic behind electronic paper technology: It's designed to look like printed text on a paper. According to the Web site of E Ink Corp., the Cambridge, Mass.-based display manufacturer that creates the displays for the Kindle, electronic paper is created through the use of

tiny microcapsules approximately the diameter of a human hair.

"In one incarnation, each microcapsule contains positively charged white particles and negatively charged black particles suspended in a clear fluid," the site said. "When a negative electric field is applied, the white particles move to the top of the microcapsule where they become visible to the user. This makes the surface appear white at that spot. At the same time, an opposite electric field pulls the black particles to the bottom of the microcapsules where they are hidden. By reversing this process, the black particles appear at the top of the capsule, which now makes the surface appear dark at that spot."

Consumer response to Amazon.com's Kindle device has been tempered. Customer reviews on the site express a wide variety of opinions.

"The device is and always will be an e-book reader, and it is designed to replicate a book," wrote Jeffrey D. Kenewell of Harrisburg, Pa., in an online review featured on Amazon.com. "That is where the device first struck me as amazing. First off, the Kindle uses electronic ink to produce print that appears (to me) just like the pages of a book. Contrary to reading on a computer screen, this presents the reader with a gray-white background similar to pages, producing a comfortable and similar reading experience."

Other reviews were not so stunning.

"(The) page turns have an annoying black flash," wrote one N.J.-based user reviewer who identified himself as "geek squad central." "Some people report they get used to it, but it's definitely a turn-off for me. I have seen other e-ink device prototypes that do not have this flash, so waiting for version 2.0 might be a good idea."

As the technology continues to develop and overcome the perceived snags, enterprising signage deployers likely will find creative new uses for it.

Moran points out that electronic paper could be used to create visually dynamic street signs.

"We're pretty excited to see that technology develop and come online," he said.

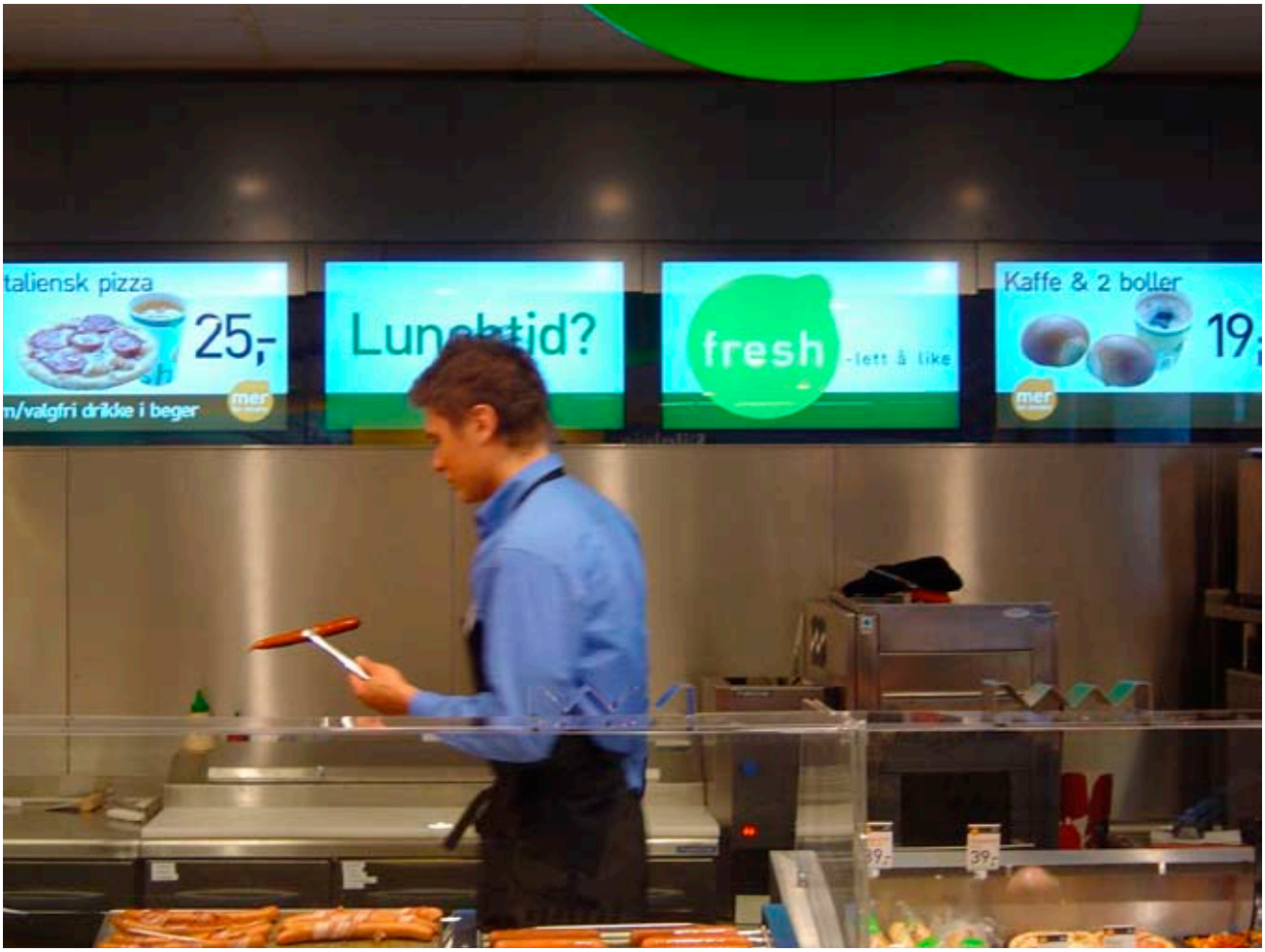
Until then ...

Each of the technologies in this chapter requires much more development before they'll be deployed on a mass scale. But digital signage deployers that wish to remain on the cutting edge of innovation would do well to stay abreast of their progress. By keeping an ear to the ground, deployers will be well positioned to pounce on any new opportunities.

Chapter 3: Coming up next

"New technology translates into one thing: new opportunities," said Snaidauf. "New opportunities to serve your customers, new opportunities to break new ground and — last but not least — new opportunities to get a leg up on the competition. If deployers can recognize these new technologies as they develop, harness their power and meld them to somehow meet consumer demand, they'll be in a very enviable position as the future unfolds."

Chapter 4: Understanding HD



HD content and high-resolution screens allow even everyday deployments to stand out.

If there's one thing everyone wants, it's better screen resolution.

Screen resolution and screen size probably are the two biggest factors in the front of consumers' minds when they start trolling the aisles for a new digital display. And who can blame them? That slam dunk at the end of the fourth quarter looks much clearer when displayed in a superior resolution. When No. 99 hits the wall and spins out during the NASCAR NEXTEL Cup Series, a high-resolution television will enable the viewer to see each tiny spark in crystal clarity. Even the political junkie will notice the difference when he can watch parliamentary discussions in sharp distinction.

But more importantly, superior resolution will increase the likelihood that the casual consumer will be drawn irresistibly to your digital signage display.

Chapter 4: Understanding HD

High-definition — or "HD" as it is commonly called — is the term used today to describe the highest screen resolution available. It's quickly becoming the standard for digital entertainment, and entertainment in general. Eager for a better picture, consumers increasingly are demanding HD.

"High-definition television, or HDTV, is the highest form of digital television," stated a fact sheet on the LG Electronics Inc. Web site. "We're in the midst of a national transition to this new form of televised entertainment — and for good reason. In the 1980s, at the urging of broadcasters, the Federal Communications Commission began to explore ways in which to transition from fuzzy, old, analog TV to crystal-clear HDTV. In the '90s, led by pioneering developments at U.S. companies (including LG's Zenith Subsidiary), and due to the many efficiencies of digital, the FCC decided to take the 50-year-old television system from analog to digital."

A looming deadline

The deadline is Feb. 17, 2009. By that time, all television broadcasters are urged by the FCC to convert their signals from analog to digital. Although some stations already broadcast in digital, others have yet to make the conversion. The deadline, mandated by the U.S. Congress, will force them to digitize. The FCC says this will create a dual advantage: It will free up the analog broadcast spectrum for public safety communications, while enabling broadcasters to offer high-definition programming to their viewers.

To educate consumers about the digital conversion, the FCC created a Web site called DTV.gov to disseminate information about digital television. A counter on the home page slowly ticks down the time remaining until the deadline.

Consumers are advised to take notice: After that point, conventional analog television sets no longer will be able to receive the digital programming without certain modifications.

"Because Congress mandated that the last day for full-power television stations to broadcast in analog would be Feb. 17, 2009, over-the-air TV broadcasts will be in digital only after that date," according to the fact sheet. "If you have one or more televisions that receive free, over-the-air television programming (with a roof-top antenna or 'rabbit ears' on the TV), the type of TV you own is very important. A digital television (a TV with an internal digital tuner) will allow you to continue to watch free, over-the-air programming after Feb. 17, 2009. However, if you have an analog television, you will need a digital-to-analog converter box to continue to watch broadcast television on that set. This

converter box will also enable you to see any additional multicast programming that your local stations are offering."

The choice will be simple: Purchase a digital television or a converter box. While special coupons will be offered by the National Telecommunications and Information Administration to make the purchase of a converter box cheaper for U.S. residents, it's highly probable that many households will decide to purchase a new digital television.

Those developments are significant, not just for the casual TV watcher but also for digital signage deployers. The conversion will mean that consumers will feel much more at home with digital technology. Even more importantly, it likely will open the gates to unleash a flood of high-definition programming, some of which could by utilized by signage deployers. Although it's a common misconception that digital television and HD are one and the same, digital television does enable the broadcaster to broadcast HD channels.

In any event, high-definition is here to stay — and that's good news for everyone. For the committed couch potato, it's a great way to watch his favorite TV show. For the digital signage deployer, it's an effective tool to grab the attention of the consumer and hold it until the message is conveyed. With that in mind, it's advantageous to have a basic understanding of some important terms related to HD, as well as the most prevalent screen resolutions on the market. For the rest of this chapter, we'll delve into these facts.

Progressive scan vs. interlaced scan

If you've been around the world of HD long enough, you've probably heard of the terms "progressive scan" and "interlaced scan." But what do they mean? Are they significant?

According to experts in the digital signage industry, they are. They both refer to the process by which the CRT or digital display creates the image on the screen.

"A progressive scan DVD player in a residential environment can convey much better picture quality because it's essentially writing twice the information versus an interlaced one."

— Sean Moran, president of Out-of-Home Media Networks Thomson

To understand the processes by which progressive scans and interlaced scans work, it helps to think of a television picture as a series of horizontal lines.

To put it simply, televisions using the interlaced scan method require two complete passes of the screen to produce the image. In this process, the television renders every other line. First, it might render all of the even-numbered lines. Then it goes back and renders the odd-numbered lines.

"There were technical reasons for (interlaced scans) to happen … when TVs weren't fast enough to fill them all in at once," said Bill Gerba, CEO of Fort Lauderdale, Fla.-based WireSpring Technologies Inc. "So it kind of became the standard format."

In contrast, progressive scan renders each line in order, taking one pass.

"Progressive scan gets back to the idea of drawing every single line in every single frame," Gerba said. "It gives you a much sharper image and smoother-looking motion."

While interlaced scan often is associated with older-model CRTs, progressive scan often is associated with digital displays and high-definition televisions. But in reality, you can find HD digital displays that use either scan mode. Not surprisingly, industry experts prefer progressive scan hands-down.

"Progressive has really come online with digital coming online and really being able to do a much higher-quality video image," said Sean Moran, president of the Out-of-Home Media Networks business unit in the Technicolor services division of Paris-based Thomson. "A progressive scan DVD player in a residential environment can convey much better picture quality because it's essentially writing twice the information versus an interlaced one."

Understanding video modes

Now that you have a basic understanding of digital television, HD and progressive scan, you're ready to launch into the intriguing realm of screen resolutions and video modes. Although the terminology may seem slightly off-putting at first, the concept behind it is relatively simple.

Content can be played or broadcasted by eight types of video modes: 480p, 480i, 576p, 576i, 720p, 720i, 1080p and 1080i.

As you can see, the video mode — as written — consists of two parts: a numerical figure and a suffix (expressed as "p" or "i"). The numerical figure refers to the lines of vertical resolution available on the display. For example, a display with a screen resolution of 1920 by 1080 pixels can display any content played or broadcast in a video mode of 1080 or below. The suffix denotes whether the image is broadcast or played using progressive scan or interlaced scan.

For example, a 480p video mode indicates that the display featur-

ing 480 lines of vertical resolution is playing content in a progressive scan mode.

As you can imagine, a higher number of vertical lines usually results in a better picture, so 1080 is the optimum number, with 480 being the least appealing. Televisions and monitors that fall under the 480 and 576 families generally are standard-resolution CRTs, similar to what would be found in households in the 1980s. Displays in the 720 and 1080 families typically operate in high definition. HD television broadcasts typically appear in 1080i, while content played from a Blu-ray disk appears in 1080p.

In a report titled "A Lesson in High-Definition," authors David Berman and Richard Glikes explain the relation between video modes and high definition. Berman is head of sales training for the Home Theater Specialists of America, a Chester Springs, Pa.-based association of home theater experts. Glikes is executive director of HTSA.

"To qualify as high definition, the minimum resolution currently available is 1366 by 768 (minimum pixel count required to display a 720p signal), and the maximum is 1920 by 1080 (the pixel count required to display 1080i or 1080p signals)," according to the report. "The source, or signal, such as HD or DVD, is the device sending the media to your TV. The control, or processing engine, such as the receiver or amplifier, and the display, or screen, be it a flat-panel or traditional cathode screen, must all be capable of either producing or processing this high resolution to maintain picture detail and achieve high definition."

The upshot of video modes is simple: To get the best possible picture, purchase a 1080 display.

Conclusion: Where you go from here

We hope you now have a firm grasp of what digital signage is and where it's going. As anyone in the industry will tell you, it's an exciting field to be involved in, as it's poised to revolutionize the way advertising is conducted. By intercepting the consumer in a way that is both visually entertaining and informative, digital signage can cut through the annoying clutter of outdated posters and unwanted direct mailings to engage the prospective customer.

"I don't want to put down traditional media like posters, print ads and banners, because I think that there will always be a place for such mediums," said Ron Snaidauf, vice president, commercial products, LG Electronics USA. "But the problem with print media is it quickly becomes outdated. That poster advertising the orchestral concert becomes worthless the moment the curtain is drawn. Then you have to spend additional dollars to create the next poster, and you have to send someone to take down the old one — and quickly, before people start to ignore that ad space.

"Compare that with digital signage, where content can be changed and updated at the click of mouse," he added. "It's all in real-time. That's the greatest advantage."

Is digital signage right for you? If our only goal was simply to sell digital signage displays, we would give you a preprogrammed response: "Of course it is! Digital signage is the wave of the future!"

"The problem with print media is it quickly becomes outdated. That poster advertising the orchestral concert becomes worthless the moment the curtain is drawn. … Compare that with digital signage, where content can be changed and updated at the click of mouse."

— Ron Snaidauf, vice president, commercial products, LG Electronics USA

But that's not always the case. It depends on your unique position in today's market. What are your needs? What messages do you need to communicate to your prospective customers? How often do you need to convey them? How can you best reach consumers where they are?

If you're looking for a dynamic medium that grabs attention and holds it, that can be updated at the drop of a hat and installed quickly and easily, then digital signage might be right for you.

The digital revolution is here. Will your company get on board?