

# Digital Signage Hardware

What you need to know when choosing a media player and other components



**INSIDE:** There's more to digital signage than flat-panel screens. This guide introduces these components and how to select the best ones for your project.

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## Digital Signage Hardware

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**Audio Video Interactive** is a pioneer in the digital signage industry. Founded in 1997 as an original electronics manufacturer, the AVI management team brings experience from the technology, media and advertising industries. With the goal of delivering the most innovative and complete digital signage solution, AVI designs and manufactures digital signage hardware including online content management software to remotely deliver content to devices.

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# Introduction

Imagine a high-powered luxury automobile. The first thing you may notice is the exterior. It's eye-catching, sleek and usually donned with a vibrant color. The next thing you look at is the driver's seat, where you will be controlling the car from. The steering wheel is decked out in leather and stitched perfectly to the contour of your hand. The top half is an exotic wood grain. From there, an electronic powered steering column is supported by traction control systems and integrated power steering. Last and most importantly, a driveshaft runs straight into the engine. And any car fanatic will tell you the engine is the most important piece of the puzzle.

Now, consider a digital signage network. Like a car, a digital signage network is built for performance, versatility and attractive looks.

On the outside, we see huge screens, sometimes up to 103 inches, narrowcasting flashy and attractive content. Like the latest model vehicles, digital signs are such a new concept that they sometimes can stop consumers in their tracks.

All networks are controlled from a central PC, not unlike the computers we use at home or at the office. Sometimes, these PCs are on the site of the digital signage network, but, with the right software, they have the ability to manage digital signage content from anywhere in the world using an Internet or cellular connection. The PC puts the user in the driver's seat of the network, if you will.

The PC operates the digital signs through a series of cables and inputs and outputs. It is becoming more common to operate the signs wirelessly, through broadband Internet, Wi-Fi and cellular connections. These wires and connections are comparable to the steering column and driveshaft of our luxury car, giving the driver/user good connections to operate the machinery.

But, as we discussed earlier, a car's engine is the most important part of the vehicle. Likewise, a digital signage network cannot operate without a digital media player. Digital media players are like extensions of PCs that are specifically designed to run the content created and managed on the PC to one or more digital signs in the network.

This guide is like a mechanic's reference to the engines of digital media networks.

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Bill Yackey  
Editor,  
DigitalSignageToday

# Chapter 1

## What do you need from your media player?

**A** media player, as in those used in digital signage networks, can be a confusing concept for some. Digital signage media players are not to be confused with software media players, such as Windows Media Player or Real Player, that come loaded on your PC. Instead, they are outboard hardware boxes controlled through PCs. Media players for digital signage are the mechanisms that drive and support the content seen on flat screens in retail stores, menu boards, billboards and other applications.

Media players are equipped with dedicated on-board video chipsets or high-end video cards that store and run digital content. Although the concept for media player seems simple, they can differ greatly. For example, some may run on Linux, while others run on XP or Microsoft Embedded operating systems. There also is a difference between solid-state players and those with rotating disk drives. Media players with rotating disk drives require the use of internal fans and must be used in ventilated areas. Consequently, they are considered by some in the industry to be less reliable than solid state players with no moving parts. We will discuss the advantages of solid state players later in this guide.

When deciding on a media player to use in a digital signage deployment, Brad Fairman, vice president of AVI, says to ask the question: “What will it



do tomorrow?”

“Don’t be afraid to ask questions about the media player’s performance in the future,” Fairman said. “The technology is always changing, so you want to make sure you have adequate performance to handle applications that may come around several years from now.”

Secondly, Fairman says the end user needs to be informed of the industry and should know what applications might arise in the future. From there, he can make an educated investment in technology that will last.

“Most companies start out knowing they want to implement digital signage on some level,” Fairman said. “However, they might not know how they want it to work for them, both today and tomorrow.”

*Digital signage content, such as this from Scentsa, is delivered to the screens via a media player.*

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Another consideration many deployers are faced with is the number of media players that should be present on their network. Let's consider a digital signage deployment at a retail clothing store. The store has several digital signs in the store windows and throughout the retailing area. This scenario has two possible solutions, both with advantages and disadvantages.

One option is to run all of the screens off one central computer containing one media player. In this instance, the media player would contain several video cards that would run different content onto separate screens.

In this option, deployers have to worry about the service, repairs, maintenance and uptime of only one computer and one motherboard. Many media players in this type of deployment have dual processors for extra power, extra RAM for faster performance and a large hard drive for storage space.

This option seems to be the most popular choice for digital signage deployments presently. There is a disadvantage, however. There is one motherboard, one media player, one computer. This means that one problem with that unit can jeopardize the performance of the entire store's network. If the main media player or PC happened to go down or freeze up, then all the digital signs on the

network will either be stuck on one screen or have no image on them at all.

The second option is a solution to that problem, but it is not perfect either. By having multiple media players, one for each display or monitor, there are more points for failure but a better chance of uptime if one goes down. If a media player or PC freezes, some screens in the network still are active. If the main digital sign goes

**“Most companies start out knowing they want to implement digital signage on some level. However, they might not know how they want it to work for them, both today and tomorrow.”**

— Brad Fairman, vice president, AVI

down, content can be routed to other screens so there is no real downtime in which the customer cannot access the information.

### **Choosing the right media player for your application**

Every digital signage deployment is different. As we point out in the chart on the following page, some networks have many screens controlled by one PC and media player, while others may have a 1:1 ratio of screens to controlling devices.

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### One central media player, or several remote ones?

#### One media player for a digital signage network

**Advantage:** Deployers have to worry about only one possible point of failure, making the network easier to manage.

**Disadvantage:** If the computer goes down or freezes, the entire network is in stalemate.

#### Multiple media players within the network

**Advantage:** If one media player goes down, others on the network still can narrowcast the content.

**Disadvantages:** More points of failure can mean more service and maintenance calls.

Digital signage media players can cost anywhere from \$500 to \$1,500, depending on the features needed in your application. According to Jason Cremins, CEO of Remote Media, models that hover around \$500 usually have an SVGA output of MPEG4, Web, Flash and still image playback. Models in the \$1,500 range typically provide full 1920-by-1080 HD video playback and support for live IPTV streaming.

Either way, the media player you choose for your network should be as custom fit as possible to your unique digital signage application, which is the reason that media players come in different varieties and offer different options.

In general, most of the experts mentioned in this guide advised staying away from proprietary media players, as opposed to open platform technology. Proprietary media players are designed to play limited formats of content, usually those used by the

supplier or its content-creation company. This limits the deployer to expand beyond that company or format for its future software projects.

Make sure the media player supplier you choose uses an open format media player that will allow you to not only play different types of media files, but have the option to use content from other companies in the future.

It is important to note, as Dan Kozyra, tech services manager for ADFLOW Networks, points out, media players must be ready for the future and be able to handle upgrades. To prepare for this, Kozyra says to make sure the media player is high resolution and able to accept all standard file formats.

Other experts from ADFLOW put an emphasis on the media player as well as the entire digital signage network being fully secured. They said most players on the market are not secure

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and are susceptible to hacking and intrusion. This is especially important for those operating media players on networks that function remotely through broadband, cellular and wireless connections. A worst-case scenario is that someone could tap into the network and change or alter the content narrowcasted on your screens. Network security for your screens and media players is available through your digital signage supplier.

Jeff Cohen, national accounts executive at Chyron Corp., says choosing the right media player is one of the most key steps in the process of setting up a digital signage network.

“There are simple, low-cost media players and complex, expensive ones,” Cohen said. “But what will it take to keep your audience’s attention? It’s all about engagement.”

Consider the aspects of your deployment and what content you intend to run on the player. Some customers only utilize a repeating loop of content, in which case they don’t really need a lot of space or bandwidth associated with the player.

If the player is intended to play more than a small, repeating loop of content, you’ll need more media player. That means more storage and more network bandwidth.

“In order not to drown in the task of creating fresh content, deployers need to have more automation that creates new, recent and relevant content more or less by itself,” Cohen said.

### Indoor vs. outdoor

Jimmy Dun, vice president of business development for Dynasign, thinks digital media players are better off being less complex.

“While mainstream media players vary in sizes, operating systems, storage types and working environmental tolerances, they are all simple PCs under the cover,” Dun said.

Dun laid out the basic requirements of two deployments, a simple indoor sign and a large outdoor deployment. He said for general, small digital signage deployments that are indoors where space for the media player isn’t not an issue, any brand of computer PC will do. In this situation, a small-sized media player will work better for placement behind a computer but sometimes can be more expensive because of its compactness.

For extreme environments and harsh conditions, such as temperature, dust or vibration, faced by outdoor digital signage deployments, certain hardware must be chosen to protect against the elements. Later in the guide, we will discuss fanless and

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solid state media players, which are preferably used with outdoor deployments because of their sturdiness and low-maintenance tendencies. In addition to the media player, outdoor deployments need a sturdy steel or plastic enclosure that is equipped with its own heating and cooling system.

“No matter what media player is chosen, make sure to stay with the same hardware across the entire network,” Dun said. “It will benefit the ongoing support and service of the network for a long time to come.”

### Are you connected?

With one of their biggest benefits being remote management and networking, digital signage networks have taken off in the past five years because of the increased use of broadband Internet and Wi-Fi access. In the past, it would have been difficult to access and manage large digital signage networks because of the slow speed and unreliability of dial-up Internet. The connections were volatile because they were analog and ran through existing landline phone wires. A dropped call is frustrating, but translated into the digital signage realm a dropped call would mean downtime for the digital signage network.

Most Internet connections now are high-speed broadband. This signal

is digital and is normally connected through cable instead of phone lines. Broadband always is on and requires no dial-up, making it ideal for use in digital signage networks designed for 24/7 operability.

Broadband connectivity also is a major player in the spread of digital signage networks because it allows these networks to be set up anywhere. Before, phone lines had to be run to dial-up modems to receive an Internet signal; now, broadband has opened the doors to wireless connectivity options.

Wi-Fi signal broadcasting is one such option that is particularly useful for deployers and their networks that operate their digital signage from a PC on site. Wi-Fi uses a router to send the same high-speed broadband signal the computer is receiving from the cable to all receptors within a given area. With most commercial-grade routers the signal has no trouble reaching all screens within the network.

For more remote deployments, such as multi-location applications where all the screens are controlled through a central remote source, cellular connectivity is an option. Cellular Internet connectivity operates on the same digital network as cell phones do. It is the same technology that allows cus-

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tomers of Sprint, Verizon, etc., to access the Internet remotely on laptops using special wireless cards.

### Some common misconceptions

When someone goes to buy a car, he typically knows what to look for. He checks maintenance records, uses the Blue Book for pricing information and generally knows the reliability reputation of each brand of auto. (He even kicks the tire, as if that says something about the quality of the vehicle!)

With digital signage being such a new frontier, the majority of deployers and deployers-to-be don't have the years of knowledge and experience with the product that they may have with cars, leading to a slew of common misconceptions about digital signage and media players in general.

Like any other product, media players have high and low ends of the product range. Wayne Ruttle, vice president of sales for ADFLOW Networks, says companies often look for the least expensive media player without understanding the limitations that come with that decision. Like anything else, if the deal sounds too good to be true, it usually is. By purchasing media players on the lower end of the product line, deployers run the risk of poor quality and shaky reliability, something everyone should avoid when acquiring any type of electronic devices. Chances are the deployer

will end up losing more money in repair and downtime of his equipment than he will save by purchasing a lower-quality product.

On the other hand, Ruttle also warns that many solutions in the market offer a very expensive, proprietary multitasking media player because of that system's requirement to be the central brains of the networked solution. In other words, the media player may be outlandishly expensive because of extra features it has borrowed from the PC to allow users to control the digital signage network through the media player. In some cases, these features can be beneficial and even necessary. But in most cases, deployers may get trapped into spending more than they need on extraneous features.

As a general rule of thumb, Ruttle said the cost of the media player should be less than the cost of the display screen it is powering. He also said digital media players should not be proprietary in nature, meaning that they can run content from all companies and are not limited to the content created by the supplier of the media player. They should be able to accept content in all file formats — such as Flash and .mpeg — and, of course, be secure on the network.

Fairman says the biggest misconception among deployers is that any computer laptop has the power to

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drive a digital signage network. For someone not in the digital signage industry, this misconception is understandable. After all, almost every Windows-based PC has Windows Media Player (WMP) built into the OS. When we play movie files on our computers, WMP is often prompted to play the media as the default player.

Many users will wonder why they can't simply play digital signage content from the media players on their PCs. Although many of today's PCs have the power to run content to screen, they were not made to do so.

The misconception may have arisen from the fact that PCs are a part of digital signage networks, as we mentioned earlier, but they don't have enough power to drive the content, only create it and control it. Powering that content to the one or more screens on the network is the job of the digital media player.

That said, controlling a digital signage network is as easy as operating a PC. Fairman said many deployers believe digital signage implementation is difficult to manage. In reality, today's digital signage "imps," or implementations, are completely transparent to most users. Most providers set up their systems so they are completely plug-and-play. Fairman said about 15 minutes of training from a reliable digital signage solution provider is all it takes to teach an end user how to

grasp the basic functions required to operate a network.

Even though they operate in an industry that produces 103-inch LCD screens, some deployers still go on the concept that less is more, a misconception that is pointed out by Cohen.

"Less is only more at the beginning of digital signage," Cohen said. "Once the atmosphere becomes more competitive, it will take a more sophisticated network and more sophisticated players to maintain audience engagement."

It can be painful and quite expensive to redo a digital signage network. Especially when operating in a field where the technology is constantly being upgraded, Cohen advises that prudent network deployers should try to build a high-quality and dynamic network the first time around, saving themselves the headache of replacing their hardware a year later.

# Chapter 2

## Who is building your media player?

**Y**ou've looked at your application. You've decided what kind of media player you need. Now you need to find a supplier.

Consider the luxury auto analogy again. When buying a car, the dealership can make or break the purchase, depending on what kind of service you get during the purchase and what kind of service you think you may get in the future. In some cases, the type of car you buy can even be affected by your preference to one dealer over another.

The same goes for choosing a supplier for your digital signage network and media player. Since the players in the digital signage industry are establishing their reputations and the industry is growing, the consumer has to be diligent in choosing a supplier that works best for them.

### Do you have first-tier support?

A first-tier support system is one of the most important things to look for in a digital signage provider. By ensuring that an existing immediate support system is in place, these companies can make sure that when a problem occurs, the supplier knows about it immediately and can repair it, either remotely or on site.

Some companies, such as AVI, use computer programs within their network content management software to monitor their screens and give

support, while at the same time allowing the deployer to actively monitor his own network.

“Our first-tier support system notifies us immediately, within minutes, if there are any problems with any players on the numerous enterprises that we maintain,” Fairman said. “From there, depending on the notification and scale of the problem, we notify our installation/maintenance team who maintains our various networks.”

Some companies farm out their service to contract service companies, but digital signage experts advise against that. Since digital signage is a new industry, experts suggest customers ensure the supplier has a first-tier support and service system within the company itself.

*The DA Lite from AVI is an all-in-one digital signage option that features a built-in media player. (Photo courtesy of AVI)*



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“We provide complete support and integration functions, because nobody knows our products better than us,” said Ron Johnson, vice president of marketing for Adtec. “This allows us to get into projects that require complex functional operations. Our products have been loaded with features that far surpass any competitor. Knowing how to use advance features takes a great deal of knowledge.”

It makes sense for the creator of the product to be the one to service it. Suppliers take pride in their service programs, using them to leverage their knowledge bases and be more attractive to deployers.

Remote Media, a British company, also maintains a first-tier support system for its SignageLive platform. CEO Jason Cremins says the company headquarters has a comprehensive e-mail and telephone helpdesk that is contacted by the network if there are problems.

“If a device does not connect to our server on three occasions, our support staff will contact the location and ask the people at the site to perform a system check and restart where required,” Cremins said.

### Two ways of getting things done

Mike Abbott, vice president of ADFLOW Networks, says there are

two ways of deploying and then supporting a digital signage network.

First, a company has the option of going through the IT department and buying off-the-shelf hardware and software and then putting the system together itself. Possible, but not recommended.

**Partner with a company that provides all the components, such as hardware, software, network infrastructure and, most importantly, support.**

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Option two is the smart road: Partner with a company that provides all the components, such as hardware, software, network infrastructure and, most importantly, support. This hosted type of solution takes the burden off your company’s IT group and results in the lowest cost of ownership when it comes to supporting and maintaining a digital signage network and its components. Also with a hosted solution, a state-of-the-art active monitoring service is in operation 24/7.

“This kind of system also allows easy remote access to updating and maintaining and provides endless

## Chapter 2 Who is building your media player?

reporting data on the health of the network as well as the performance of the content and display screens,” Abbott said. “This is very difficult — if not impossible — to accomplish with a build-it-yourself system.”

### Identifying the problem

The digital signage vendor should provide first-tier support for the media player to identify whether the problem is software or hardware, said Jimmy Dun of Dynasign, even if the deployer is using standard computer hardware from a third party.

“The support will be much easier if the digital signage vendor provides both media player hardware and software, since it is a certified set,” he said.

Dun says the first step is to identify the problem on a media player to separate the hardware, software or operating system problem. It is not a trivial task in most cases; however, that is one of the reasons why the digital signage vendor needs to be the first-tier support provider, no matter where the hardware is from. From there, the vendor can identify the nature of the problem and either instruct deployers on how to fix the problem on their own or send a crew to fix the problem.

Dun said it is important for the deployer to investigate the digital

signage company’s support policy during the evaluation. Based on the deployer’s in-house technical expertise, the deployer can choose the source of the media player carefully. If budget allows, the media player hardware and software should come from the same digital signage vendor.

### The re-branding of media players

OEM stands for original equipment manufacturer, and it is a term that constantly floats around the digital signage industry. The industry is made up of companies that offer products they manufacture themselves and also many products that are resold or outsourced for manufacturing. For complete signage solutions providers, it would be impossible to manufacture all the components in a digital signage network in-house and still provide consulting and integration services. So don’t panic if your media player provider isn’t the OEM of the product.

Take AVI, for example. For its Digital Associate media player, the company still did all the research and programming in-house to make sure it had complete control over the media player.

“This allows us to provide the best customer support and project flexibility,” Fairman said. “Since we developed the product, no one knows

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it better. We can react to customer requests quicker than other companies that rely on offshore parts and equipment. When you deal with overseas manufacturers, you're at their mercy.”

# Chapter 3 Electronic reliability



*The Digital Associate is AVI's advanced interactive, solid state MPEG 1 & 2 media player.*

**T**he biggest dichotomy that exists in the digital signage media player market is between solid state (SSD) and moving disk hardware types. Different media player manufacturers will generally stick to one of these types of formats to make their media players. Although there is no consensus on which type is better, more often than not digital signage experts lean toward solid state.

Solid state players and storage devices have begun to replace moving disk storage units not only in digital signage players but in household and commercial PCs as well. SSDs are based mainly on non-volatile memory rather than the mechanical-magnetic component found in moving disk drives. In those drives, two magnetic disks

spin in opposite directions causing a charge, which then makes it possible to store information inside them. This is the reason your PC may sound like an engine revving up when you turn it on or save a file.

SSDs typically best the moving disk players for several reasons. First, they obviously have no moving parts. This eliminates seek time (the time it takes for your computer to spin the disks to search for previously stored information) and other micromechanical delays that can

**“There is no question that the solid state storage drive will outlive the moving disk drive.”**

**— Jimmy Dun, Dynasign**

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come from the disks not spinning correctly or mechanical failure in the motors that spin the disks.

### Life expectancy

Flash drives in their SSD form have a longer life expectancy than moving disk parts. The data lifetime of a flash drive also can be extended if the data is refreshed often. To go into further detail, flash drives typically have about 100,000 to 300,000 write cycles, or times the data can be copied over onto them. Flash drives are made up of storage blocks, as opposed to the magnetically charged moving disks in non-SSD drives.

Each flash drive has a feature called wear-leveling, which allows the stored information to be evenly distributed among the blocks within the drive. These blocks are usually about 1 kilobyte in size. It is estimated that a heavily used flash drive, that is, one that is continually being rewritten, will last about 10 years.

It should be noted that new SSD media players for digital signage now have more than 1 million write cycles.

“In the real world, mechanical moving parts will fail eventually due to the operating environment conditions,” Jimmy Dun of Dynasign said. “An average hard drive will operate continuously for two to three years under the normal operating temperature and humidity level.

### MISCONCEPTION ALERT

#### Computers built for 24/7 use?

We leave our PCs on at work all week. We leave our home computers running while we are gone, then come home and wake them up by moving the mouse so we can check our e-mail. From this commonality came a misconception about the hardware that powers digital signage that industry professionals often discuss: Customer think computers are built for 24/7 use.

#### So what's the difference?

“Low-cost traditional PCs are not a viable option as media players as they are not built for continuous operation in a commercial environment, which is the case in most DS networks,” Ruttle said. “Temperature, dust, humidity, impact, tampering and connectivity all have an adverse impact on hardware and the total cost of ownership will increase with the use of low-cost PCs as media players.”

Take also into consideration that your home and work computers are hibernating when you aren't using them. During hibernation, the computer limits the amount of processes that are active. A 24/7 digital signage network cannot hibernate.

“Regular computers just are not meant to be used in 24/7 duty cycles,” Cohen said. “Such use — for instance, constantly accessing a hard disk — will significantly shorten equipment lifespan. Mirror and RAID schemes can provide additional system resiliency, but at a cost.”

Cohen also reiterates, depending on how accessible your devices are, that deployers develop a service plan that depends upon either redundancy or field service.

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The volatile physical movement while the hard drive is spinning will reduce the hard drive life time for certain.”

What it boils down to for digital signage media player owners is that the cost of service and downtime to fix a moving disk player does not equal the increased cost of SSD players of equivalent size.

“Solid state players are just now developing into a viable alternative from a cost of ownership perspective a capacity standpoint,” said Mike Abbott, vice president of ADFLOW Networks. “Once they are ready for broad use, they will offer a more robust and reliable solution with longer mean time between failure — a better way to go.”

Dun agreed on the reliability and future of the SSD players.

“There is no question that the solid state storage drive will outlive the moving disk drive,” he said.

# Chapter 4

## The ins and outs of inputs and outputs

Looking at the back of a big-screen TV may make you crazy. There is a colorful array of inputs and outputs for HD, DVD players, antennas, cable and other components. Thankfully, digital signage media players are a bit more simple. Like the TV, though, the more inputs and outputs that are offered, the more versatility the player has.

It should be noted that TVs with a 4:3 aspect ratio are like our traditional CRT (cathode ray tube) screens. Today's widescreen TVs, like most of the screens used for digital signage applications, have a 16:9 aspect ratio.

### VGA

Several types of outputs are commonly used with digital media players. VGA outputs are the standard connection format found in most media players.

“VGA tends to be the de facto standard now, as most media players are PC-based, and most PCs are equipped with VGA out,” Cohen said.

While VGA continues to be one of the most common connections for digital signage, HDMI also is emerging as an option and being implemented where companies formerly used VGA.

### Legacy

Legacy outputs are the original S-video and composite outputs.



AVI offers deployers a Web-based, remote content management tool for its Digital Associate media player.. (Photo courtesy of AVI)

Wayne Ruttle, vice president of sales for ADFLOW Networks, calls these the “old-school video outputs” because they generally support the traditional 4:3 resolution quality video and, when used with 16:9 ratio flat screens, the composite signal must be stretched.

### USB

USB inputs, in the overall technology sense, are very versatile. However, while they have the ability to transmit signals, in the digital signage realm they are not heavily used for this application. Instead, they are used to connect outside component — such as keyboards, the mouse, motion sensors and bill acceptors — to the network.

## Chapter 4 The ins and outs of inputs and outputs

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### Serial inputs

In digital signage applications, the panel control from the media player is linked by serial connections. However, there are no standards for the signal, so each model of screen and media player will most likely require custom configuration of the media player. Serial connections are also used for interactive devices such as touchscreens and barcode scanners.

**Like TV, the more inputs and outputs that are offered, the more versatility the player has.**

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# Chapter 5 **Choosing the right OS**

**A** digital signage network is a consumer-centric endeavor, which simply means that your customers will not really care what is going on behind the scenes, so long as it provides them with the right information. The customer viewing a screen does not care what software package is being used to deliver the media, and he certainly doesn't care whether it is running on Windows, Mac OS or Linux.

That said, the selection of software does go hand in hand with selection of an operating system, so it makes sense to keep the options in mind at the front end. If the best software package for your needs is written to run on Mac, that means you'll have to plan your hardware purchases accordingly — and you may have networking issues if your existing infrastructure runs Windows or UNIX.

Here is a quick overview of the three major operating system options for digital menu board and restaurant digital signage networks, and their relative strengths and weaknesses.

## **Windows**

The big hitter of operating systems, Windows boasts the largest installed base and support infrastructure. As a result, it is the first choice for many developers.

"We've played around with a lot of different operating systems over the

first 15 years of our operation," said Doug Peter, president of St. Clair Interactive, which exclusively builds solutions on the Microsoft platform. "We made the decision to standardize on one, because we don't believe you can be an expert on everything."

Peter said the ability to communicate with legacy systems is key; otherwise, a new in-store technology turns into a "silo" and becomes a source of extra work and expense rather than a means to reducing those things. Windows, in his experience, does the best job of "middle-manning" all the new connections that need to be made to get the project to work.

"Most clients have a huge variety of platforms in their enterprise, and what's really essential is to find the middleware that will allow us to talk to all of them," he said. "The fact of life is 80 percent of retailers run Windows."

**The selection of software goes hand in hand with selection of an operating system, so it makes sense to keep the options in mind at the front end.**

Brian Ardinger, Nanonation's vice president of business development said the primary advantage of Windows is its "ecosystem of

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peripheral devices,” a natural result of the product’s market share: More developers building more Windows systems for more clients means more devices will ultimately be supported.

And then you have the benefit to your employees, which is not insubstantial. The fact that practically every new PC ships with a copy of Windows already installed means that workers are used to interacting with Windows machines and won’t need much hand-holding, WireSpring Technologies president Bill Gerba said.

“The large installed base means that most people are comfortable with Windows metaphors for accomplishing various actions on screen,” he said. “And it also means that on-site technicians are likely to be somewhat familiar with the OS.”

That said, Windows is not without its weak spots — and chief among them is security. Security patches are a fact of life in the Windows world; the Common Vulnerabilities and Exposures (CVE) database, which is funded by the U.S. Department of Homeland Security, lists 324 known vulnerabilities for Microsoft Windows.

“It is the biggest target for virus and spyware and adware writers, as well as the most frequent target for hackers,” Gerba said. “Many vendors find it necessary to bundle extra anti-virus, anti-spyware and remote patch

management software with the systems to mitigate the threats.”

### Mac OS X

The Macintosh operating system, like the hardware it exclusively runs on, has behind it a passionate legion of fans for whom nothing else will do. It has its fans among in-store technology developers, as well.

Sandy Nix, president of D2 Sales, said the Mac is an ideal platform for in-store media applications, with its “stunningly reliable hardware performance, rich graphics and virtually no virus vulnerability.”

She points to a kiosk project D2 developed for Burger King, an entertainment device integrated into the playground area found in many BK locations. Designed to build brand loyalty by creating a positive association between the restaurant’s food and the touchscreen games, the colorful machines were developed on the Macintosh platform.

“There are units in the field that are eight years old and never had a service call,” she said. “We manage the help desk on those units and, even though there are hundreds of units still out there, the equipment up-time average is 99.99 percent and still going strong.”

Visually, Mac has a strong reputation, too.

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“On the graphics side, Mac has some OS-level functionality that gives us a richer media experience,” Nanonation’s Ardinger said. “What Mac OS X has done with their graphics system is pretty impressive.”

Nix said the primary drawback with OS X is not with the equipment, but the fact that relatively few OS X developers are creating applications and drivers for in-store media.

“Because there are few scalable, reliable applications, there are few deployments on Mac,” she said. “That low volume means the peripheral vendors often don’t write drivers for OS X. There won’t be more deployments until there are more software and peripherals, which won’t happen until there are more deployments — it’s a vicious circle.”

### Linux

The dark horse in this race is Linux, a name that has risen in the business consciousness in recent years, thanks to a growing understanding of the open-source movement.

Confusing the issue, though, is the fact that Linux isn’t a particular “thing” — it’s a type of thing that exists in an almost endless number of varieties.

Because Linux is released under the GNU General Public License (GPL), any person or entity may take the source code, modify it as they see fit

and redistribute it. As a result, several hundred varieties of Linux are available.



Open-source software such as Linux also is undergoing constant tweaking and improvement by the army of volunteer programmers that work on it. New “builds” of the platform can be released as often as daily, which can be a major source of frustration for someone trying to develop an application that runs reliably.

“The problem with Linux is, we’re very dependent on media players,” St. Clair’s Doug Peter said. “Every time Linux changes, you would have to go in and rewrite the device handlers.”

But even with all these strikes against it, Linux has two very powerful words working in its favor: It’s free. The same GPL that enables it to branch into a myriad of different “distributions” specifies that it be made

*In-store digital signage is powered by one or more media players.*

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available at no charge. Just download an .ISO file, burn it to a CD-R and you're ready to install.

### What about Vista?

Microsoft shipped its new operating system to consumers Jan. 30; the previous 27 months had seen an unprecedented beta-testing process in which hundreds of thousands of volunteers put the system through its paces. During the test period, more than 2.3 million copies of the beta were downloaded.

For in-store media, Vista represents some amazing new possibilities — with a few very important caveats. The operating system allows developers to create rich, interactive experiences that can scale to any size screen. But hardware requirements are steep, and deployers will have to weigh whether it is worth the upgrade for their projects.

Much of the attention Vista has received has focused on its new graphical interface, which is nothing short of amazing. The Windows Aero GUI represents the first time since the release of Windows 95 that the entire Windows user experience has been taken back to the drawing board — every aspect, from buttons to dialogue boxes to icons to fonts, has been redesigned. The emphasis is on aesthetics, with liberal use of three-dimensional graphics, transparency and animation.

Aero comes with some steep hardware requirements, though. To take advantage of the new look and feel requires a processor running at least 1 GHz, 1 gigabyte of system RAM and a minimum of 128 megabytes of video RAM.

Mark Justice Hinton, author of “PC Magazine’s Windows Vista Solutions” (Wiley Publishing), said Vista is designed to run on most PCs sold in the last two years. However, users wanting to take advantage of the new graphic interface will need something very powerful.

He noted that Microsoft designates two different classes of Vista-ready PCs: “Vista Capable” and “Premium Ready.” The former has lower hardware requirements, but won’t be able to take advantage of the Aero interface.

The core of the Vista graphical experience is the Windows Presentation Foundation (WPF), which allows developers to easily manipulate video. Built-in processes make it possible to invert, rotate and dynamically size video elements and clips.

“A kiosk could have three video clips playing on the screen at one time,” writes Microsoft retail technology strategy director Tim Gruver in a whitepaper on Vista and kiosks. “A user could then bring a particular video clip to the foreground as others remain in the background or switch

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between the video clips with a simple click. This means that multiple video clips can now be easily incorporated into kiosk applications to display product information.”

Perhaps more importantly, the WPF makes it possible to create elements that are “resolution-agnostic” — that is, they grow and shrink dynamically so they look good no matter what screen resolution they are displayed at. A new emphasis on vector graphics means images and elements can be greatly increased in size without pixelization — which holds great promise for large-format digital signage applications.

WPF also has ramifications for remote content management and updating. Applications can be posted to a Web server; clients that “subscribe” to the server will be automatically updated with the new application.

# Chapter 6

## Resolutions

**A**n advantage of flat screens is, as the price point drops, the resolution of the screens continues to become sharper. At this juncture, standard TV operates at 480p, which means a vertical resolution of 480 vertical scanning lines on the screen, usually with a horizontal resolution of 704 or 720 pixels and 4:3 aspect ratio on standard-definition television (SDTV). The “p” indicates progressive scan, where the lines of each frame are drawn in sequence.

Commercial-grade flat screens used for digital signage networks are now offered in resolutions up to 1080i, the standard resolution for HDTV. This means there are 1080 lines of vertical resolution. The letter “i” stands for interlaced, also known as non-progressive scan. 1080i usually means the widescreen has an aspect ratio of 16:9, and a horizontal resolution of 1920 pixels and a frame resolution of 1920 by 1080 or about 2.1 million pixels.

**The high-definition advantage to the digital signage deployer is the same as that for an at-home DVD fanatic: better picture.**

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The high-definition advantage to the digital signage deployer is the same as that for an at-home DVD fanatic:

better picture. The ability to run content in high-def enhances content by giving it a brighter, sharper picture. Incidentally, high definition and the 1080i resolution are working their way to the standard for all broadcast television.



*High-definition digital signage content means better customer experience.*

# Chapter 7

## Other pieces of the network

### Commercial- vs. consumer-grade screens

**F**or digital signage experts, it may sound crazy that someone would consider walking into a Best Buy and purchasing a flat screen for use as a digital sign. On the other hand, some readers probably are asking, “Well, why not?”

Not all flat screens are made the same. Aside from LCD and plasma, the biggest dichotomy of digital signage hardware is between consumer- and commercial-grade flat screens.

Commercial-grade screens are the standard for digital menu board applications and most other digital signage deployments. Commercial-grade screens are designed for more continuous use than a screen you would put in your home. Consumer-grade screens have fewer hours of life expectancy, usually in the tens of thousands. Generally, it is assumed by the manufacturer that consumer screens will be on only for several hours a day.

With many consumer-grade screens, the manufacturer’s warranty can even be very limited or voided if the screens are used for a commercial application such as digital signage.

Aside from lifespan and warranty considerations, commercial-grade screens can be oriented in portrait

mode and landscape mode, while consumer-grade screens cannot. We touched on connectivity earlier, and commercial-grade screens provide hook-ups and inputs that consumer-grade screens don’t have. Commercial-grade screens have PC inputs, serial ports and VGA inputs that are used for connecting them to networks and media players. Consumer-grade flat screens are designed to connect with DVD players, video-game systems and cable line only.



### Content and content management

Just as a flat screen is nothing without a media player, a media player is nothing without content to play. Good content is extremely important as it’s one of the main factors that will attract your customer’s attention.

Inside the media player, software controls the content that is run on

*Digital signs and media players combined with good content and a solid back-end network can make for an effective in-store solution.*

Commercial vs. consumer flat screens	
Commercial	Consumer
<ul style="list-style-type: none"><li>&gt; Designed for continuous use</li><li>&gt; Can be used in portrait or landscape mode</li><li>&gt; Networking inputs (PC, serial ports, VGA)</li><li>&gt; The right choice for digital signage deployments</li></ul>	<ul style="list-style-type: none"><li>&gt; Manufacturer's warranty limited if used for digital signage applications</li><li>&gt; Only connect to DVD players and cable</li><li>&gt; Shorter lifespan than commercial grade</li></ul>

your network. This content management software plays the content at your selected times, runs the attract loop and allows you to easily change the content at any time, sometimes remotely.

Chances are your company will not design this software in-house, which is why companies that offer media players also supply content management software to help run your content on those players. Although vendors' products and offerings may differ, their explanations give deployers a good idea of what to look for in content management software.

Fairman said content management solutions developed in-house give them a better advantage by allowing the company to customize the content to its customers quickly and cost effectively.

The basics to a content management system, said Jeff Cohen, national accounts executive at Chyron Corp., are a Web-managed front end and playlist management. The playlist management system should include scheduling and asset management components and, in more advanced networks, can even include billing.

**Just as a flat screen is nothing without a media player, a media player is nothing without good content to play.**

Chyron's management software stores signage projects on a Web-based service that synchronizes the media player's content with information on its Web site via the Internet.

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The intent is that customers avoid network security issues that systems that send content to the media player are prone to, such as firewall issues, because the media players are instead pulling content from the Web server.

Ron Johnson, vice president of marketing and administration for Adtec Digital, suggests finding a vendor that doesn't distribute content solely through the Internet, in case of a connectivity failure. Companies also can distribute their content via satellite or through removable or disposable mediums such as CDs or DVDs, in addition to Internet distribution.

Jason Cremins, CEO of Remote Media, says one of the major differences in content management software is whether it is installed on a customer network or hosted. His company's software is hosted, which means no upfront installation costs and a low cost per month for proactive monitoring and help desk support.

Jimmy Dun, vice president of business development for DynaSign, points out that a well-developed digital signage/content management platform must have a flexible screen layout configuration; popular content format/type support; seamless live data integration, such as RSS/XML and TV channel; and easy-to-use content and network management console.

"The content management system must be designed to handle the publishing of content to cover the whole network, a defined collection of screens or even a single screen," Dunn said. "The 'player groups' design, which is popular among many digital signage programs, will not be adequate to manage if each screen will be showing a combination of global, regional and local content."

"The access control of the content management is another critical feature of the content management program," he added. "The system needs to provide the advanced access control for each user to access screens and contents that you are responsible for. A Web-based content management console will be very effective if each login ID has a designated access rights to review and publish contents to a predefined set of screens/players even the controls down to a zone on a collection or a single player."

# Chapter 8

## Commentary from industry professionals

**A**s part of this guide, several industry experts were contacted to discuss some of the most basic questions that potential deployers may have about digital signage hardware and digital signage media players.

In this chapter, these experts make an effort to clarify misconceptions and offer advice for digital signage deployers of all levels.

**Instead of installing an entire digital signage network, why not just play a DVD loop all day long that is connected to a flat-screen TV?**

**Brad Fairman, vice president of Audio Video Interactive:** “For one, most DVD players are consumer equipment and, therefore, they are generally not designed for 24/7 playback. Replacing a DVD player also becomes a costly and time-consuming issue. Also, by using a DVD player, trying to add interactivity to your solution becomes a problem, such as connectivity to touchscreens, bar code readers, etc.

**Wayne Ruttle, vice president of sales, Dan Kozyra, tech services manager, and Mike Abbott, vice president, all of ADFLOW Networks:** DVD players are not designed durably enough to run 24/7. Also, human intervention is required to turn on, load and maintain the DVD player. The DVDs them-

selves are prone to damage and loss. From a content standpoint, the content on DVDs does not change often enough to have an impact on viewers. DVDs also have lower resolutions and limited file sizes in comparison to content on media players, which again impacts quality of content messaging. DVDs also typically have a very low compliance rate in terms of being played in-store.

**Ron Johnson, vice president of marketing and administration for Adtec Digital:** Maybe you should. It depends on how long you need it to work without failing. DVD devices have a short MTBF (mean time between failures). Also, if info needs to be updated to many units over a wide geographic area on a frequent basis, a network-based player might be a better way to go. That is feasible only if an Internet connection can be made to all the units.

**Jimmy Dun, vice president of business development for Dynasign:** It may be fine for certain uses, like in case you just want to showcase relatively static content at a few locations. Implementing a good digital signage media player along with the centralized content and media player management platform will provide a real-time content publishing and live feed. It makes the screens more effective and interesting while reducing the cost of content distribution in the long run.

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**Jeff Cohen, national accounts executive at Chyron Corp.:** That's certainly one way to do it. Many have. On the other hand, as digital signage becomes a more ubiquitous medium, viewers will begin to avoid repetitive and irrelevant content. Adding the dynamic element means that you are telling the viewer, "Hey, there's something new here, this is worth looking at!" It's all part of the postmodern social contract between the presenter and audience. People simply won't accept the repeating loop anymore.

### Are a media player and a flat screen all you need for a digital signage network?

**Ruttle, et al:** Basically, yes. However, if the player is not networked (via Internet or satellite), you have many of the same problems as with a DVD-based system. Content must be loaded to each player manually and that opens the door for errors in ensuring content is always playing on the screens. The costs of updating non-networked systems are substantial. Also, non-networked players cannot be remotely monitored for health and compliance — again leaving the door open for blank screens, outdated content.

**Jason Cremins, CEO of Remote Media:** Other than the media player and flat screen, you need stable communications. You also need a proven platform to manage the players and screens.

**Cohen:** Pretty much. There may be shared servers behind the scenes distributing content, but as far as field deployment goes, add a few wires, an Internet connection and you're good to go.

**Johnson:** Possibly. That depends on the size of the network, how often content needs to be updated and how much content needs to be updated. Software management and distribution tolls might also be needed.

### Where is the best place for a media player?

**Dun:** The location of the media player relative to the screens is a case-by-case situation and depends on the installation conditions. It would be nice to always mount the player behind the screen or even inside a panel enclosure (in the case of an All-In-One display). However, the hardware cost of the small-footprint media player or All-In-One panel is more expensive.

**Cremins:** We always favor the player being paired with the screen or in the screen to provide maximum flexibility, but in some case it makes sense to locate the players as a channel at a central point and run multiple screens from the one player. For example, Harrod's in London runs 12 channels to 200 screens.

**Cohen:** The answer to that is behind the display. That ensures the most

## Chapter 8 Commentary from industry professionals

network granularity so that each display in the network can be independently addressed and programmed.

**Ruttle, et al:** Players are located in many places and each scenario is different. Players can be mounted to the back of each display screen, can be installed in ceilings, cupboards or shelf mounted in an out-of-the-way place at each location or they can be centrally located in a room with cable runs to screens. Some display screens have built in (integrated) media players to enable flexibility in terms of where the screens can be placed within a facility. When media players and displays are part of a kiosk, these integrated units can save on space and media players are available in a fanless configuration to cut down on heat.

### What is the preferred operating system for digital media players?

**Fairman:** Each operating system has its benefits. Linux is less costly as there are no license costs on the player side. Windows is generally easier to develop on but has an additional cost to each player in the form of an OS license.

**Johnson:** In general, most use Linux. However, Adtec found no operating system to be optimal for what we need, so we developed our own operating system. We call it the

Video Transport Operating System; it is otherwise known as VTOS. We use a combination of our VTOS and Linux in a true multitasking architecture.

**Cremins:** We utilize both Windows CE and XP Embedded. We have decided that we want to benefit from the ongoing development and support provided by Microsoft whilst removing the lack of product support associated with Linux.

**Dun:** Linux will reduce the cost because of its free, open-source nature. It requires a little less CPU power in comparison to Windows XP for the overall content play. The concerns for certain signage network operators are that there is limited media content support and a lack of Linux operating expertise in general. Therefore, Linux has a slight edge for implementing a large, homogeneous signage network with controllable content types and sources. On the flip side, Windows XP-based media players cost more than the comparable media player hardware with Linux. But it has much wider content type support and network support resources. Therefore, the Windows XP-based media player is more suitable for a signage network with open-ended content publishing and live content feed applications.

**Ruttle, et al:** Linux's open-source OS has limitations on file formats and functionality and upgradeability. Windows offers a flexible platform with

## Chapter 8 Commentary from industry professionals

no limitations on file formats and is easily cost effective and upgradeable; however, it is exposed to potential security issues if not addressed within the network infrastructure.

**Cohen:** The primary assumption in this question is that an operating system is needed for a digital signage player. This is complete misgiving. Since a digital signage appliance has no operator, there is no need for an operating system. The endpoint by the display should be a device. Like a video scaler, it has ins and outs and what happens inside the black box will not — and should not — matter to the user at all. Do you know what OS the electronics in your car run? Do you care? Any company that sells a digital signage product which requires an operating system as a base is not selling a product. They are selling a technology layer which requires expertise (IT, networking, software installation, etc.) outside of the intended user — in this case, a network operator.

# Glossary **Digital signage terms**

**A/V distribution system:** The technology used to carry the video and audio signal from the digital signage player to the display device.

**Content:** The full-motion video, audio, promotions, messaging and information you wish to deliver. It may include prerecorded information, news feeds or pricing and merchandising information delivered from the POS system.

**Content distribution server:** The computers where content is stored, managed and distributed to players via a network.

**Content management software:** Specialized software used to schedule the delivery and playback of content at multiple devices, as well as to monitor performance and track and report on the execution of the scheduled events. More advanced content management software packages also include authoring features and most include screen formatting and production capability for screen crawlers and other information feeds.

**Digital signage:** The creation, management, scheduling, distribution and display of electronic media with information of particular interest to a selected audience.

**Display devices:** The actual hardware displays on which the content is shown. These include plasma and LCD displays, projection onto a screen or holographic device, interactive kiosks or CRT devices and any number of emerging display technologies (OLED, electronic ink, PLED, etc.).

**Distribution network:** Provides the delivery and feedback infrastructure to pass information to and from the display locations. The network can take multiple forms: satellite, Internet, LAN, WAN or wireless.

**Media player:** Typically, PCs or special-purpose media devices used to store and deliver content to the display devices on the defined timetable.

**Multichannel player:** A player capable of streaming more than one channel of unique content at a time.

**Playlist:** A list of clips and their play order by time or other heuristics.

**Playlog:** A record of information created from the digital signage system reflecting the content played, the system performance and other data.

*(For a more complete glossary, visit [www.digitalsignagetoday.com](http://www.digitalsignagetoday.com).)*