



Digital Signage

Choosing the Best Video Distribution Technology

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1. Digital Signage: An Overview

Digital signage is the use of digitally powered signs (such as plasma display panels, liquid crystal displays (LCDs), kiosk stations, computer monitors and normal televisions) to replace and enhance traditional media. Digital signage is revolutionizing the media and information industries by allowing the central and rapid update of content and its immediate delivery to specific audiences in specific locations.

1.1 Components of Digital Signage

The components needed for a digital signage system include:

An **authoring console**, equipped with content management software, allowing the definition of content in a variety of playback formats.

A **server**, to which finished content is uploaded and from where it is distributed to different displays in the network.

A **distribution infrastructure**, consisting of a data network or fiber optic or CAT5 cable, which broadcasts media from the server to the displays.

Digital signage **displays**, which can be plasma displays, LCD monitors, CRT monitors, or kiosk stations.

1.2 Benefits of Digital Signage

Digital signs have already brought significant benefits to businesses and media vendors alike:

Attention grabbing advertising

A digital sign brings innovation and movement to previously static media locations, and has the power to get customers' attention, making it a particularly effective form of advertising.

Real-time advertising and information

Digital signage allows advertising and information to be updated on the fly from one remote authoring station and broadcast immediately to audiences regardless of location.

Relevant audiences

With digital signage, advertising focuses on the best potential customer: an existing one. Supermarkets have already found that current customers are more likely to purchase products advertised on their digital signs.

Cost savings

Every time digital signage users change their message or campaign, they save on printing costs and processing time.

Profit center opportunities

Businesses can create instant profit centers by selling advertising time on their digital signs to customers or suppliers.

1.3 Uses of Digital Signage

It is not surprising that, with all the benefits of digital signage, there are so many uses for it worldwide. They include:

- Advertising networks
- In-store advertising
- Interactive kiosks
- Tradeshow displays
- Corporate identity branding
- Electronic menus and lobby displays
- Branch office communication
- Campus bulletin boards
- Community bulletin boards
- Arrival and departure schedules
- Franchise communication systems
- Emergency announcement systems
- Corporate communication systems
- Back office employee training

2. Digital Signage Distribution Technology: “What Lies Beneath”

When considering a digital signage project, users usually focus on display types and content management software. For the integrator, however, there is an important component that the user rarely considers: the distribution technology and platform. This infrastructure transmits the digital video and audio from the server to the appropriate displays, and is a key contributor to actual digital signage performance. In addition, as the connecting component for all displays, the distribution technology can be a significant part of the project budget. That’s why choosing the correct distribution technology is vital in ensuring a successful digital signage installation.

2.1 Options for Digital Signage Distribution

There are three main options for digital signage distribution:

- Data network
- Fiber-optic cable
- CAT5 cable

In this paper, these options will be presented together with the core considerations in choosing a distribution technology:

- Cost
- Performance
- Existing infrastructure

3. Digital Signage Distribution Options: Platforms & Combinations

Each platform has its own benefits and drawbacks. When harnessing more than one platform. There are a number of interesting combinations as discussed below.

3.1 Data Network Platform

A data network platform uses a computer network infrastructure in order to transmit content in the form of compressed multi-media files (such as MPEG files) from the management station to the central server and from there to the computer connected to the display device. The central server handles distribution to multiple displays, and the display-end computer decompresses the file for display on the display device. Alternatively, if only one display is required, the network can transmit the compressed file directly from the management station to the display-end computer, which then decompresses and displays the file.



3.1.1 Benefits & Drawbacks

The advisability of data networks depends largely on existing infrastructure. If there is an existing computer network infrastructure, using a data network platform for digital signage can save costs significantly. However, if no computer network already exists, the need to implement such an infrastructure will increase costs considerably.

An additional cost related to data networks is caused by the need for display devices to be connected to local computers or equipped with embedded CPUs, resulting in extra investment in hardware, an important factor when costing the project as a whole.

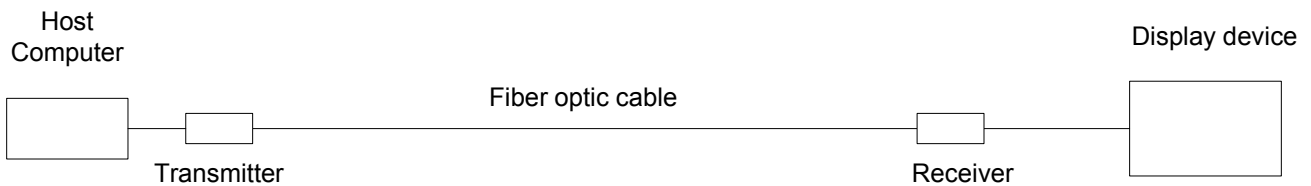
In addition, from a performance standpoint, using a data network platform has several disadvantages. A data network platform limits the user to the compression technologies available on the market today, technologies that significantly downgrade the quality of the multimedia content and the displays' dependence on the network is another major consideration for 24x7 locales that cannot tolerate display downtime.

Data Network	
Benefits	Drawbacks
Utilizes previously existing network infrastructure	Requires CPUs for each display device
	Requires network infrastructure
	Bandwidth limitations & potential downtime

3.2 Fiber Optic Extenders

Fiber optic cable is a transmission medium favored for applications that need high bandwidth, long distances, and complete immunity to electrical interference. That makes it ideal for digital signage, which requires high resolution and transmission over long distances. Unlike network platforms, fiber optic cable does not require CPUs or special software at the display end. All that is required is a transmitter and receiving unit for each display.

There are two options for fiber-optic cable: single mode or multi-mode. Single-mode fiber provides a higher transmission rate and up to fifty times more distance than multimode, but it also costs more. In general, the decision between different types of fiber should be the result of a simple cost-benefit evaluation: the distance and level of resolution or performance required versus the acceptable investment in distribution technology.



3.2.2 Benefits & Drawbacks

Fiber optic cable is optimal for transmitting high-resolution multi-media over long distances, a feature which makes it particularly appropriate for digital signage. Fiber optic cable provides network-independent performance without downtime or transmission lags. It can transfer media over 40 kilometers or more. In addition, it requires no special infrastructure, software or display-side CPUs.

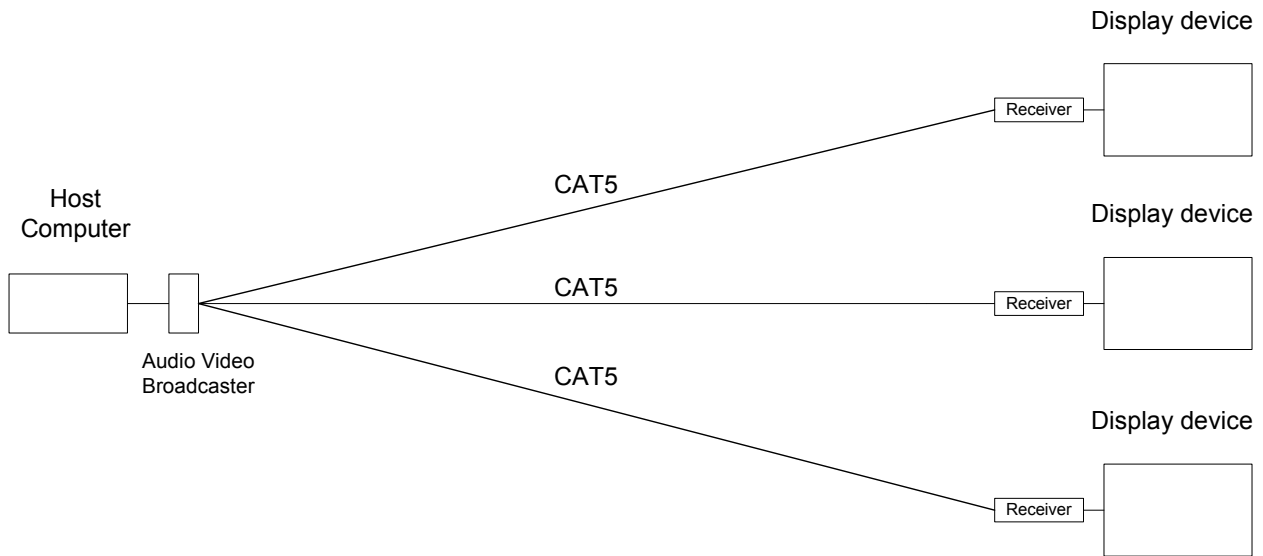
However, fiber optic is a point-to-point technology – in other words, a pure fiber optic cable solution will not allow multiple displays to receive output from a single video source. This can prove a significant obstacle for multiple-display digital signage installations such as malls and airports.

In addition, fiber optic cable has a high price relative to other technologies. Fiber optic cable’s expense can prove prohibitive when planning a large digital signage project. A possible solution, discussed below, is the combination of fiber optic cable with other, less expensive solutions, allowing the user to benefit from fiber optic cable’s advantages while reducing the total cost of the project.

Fiber Optic cable	
Benefits	Drawbacks
High resolution & performance	Point to point
No special infrastructure required	High price
No display-side CPU or software required	Special infrastructure
Pure hardware - Network independent	

3.3 CAT5 Distribution Systems

CAT5 cable is also a transmission medium favored for local installations that need high bandwidth and high resolution without any existing network infrastructure. CAT5 cable technology provides these advantages at a considerably lower cost than fiber optic cable. CAT5 technology supports real-time multi-media transfer through inexpensive, low density, twisted pair cabling.



3.3.3 Benefits & Drawbacks

In certain ways, CAT5 technology as a distribution platform combines the best aspects of fiber-optic and network technologies. Like fiber optic technology, CAT5 technology requires no special software or display-side CPUs, and is completely hardware-based and network independent. Only transmitter and receiving units are required. While CAT5 covers shorter distances than fiber optic cable (typically 100-300 m/300-1000 ft), CAT5 cable costs considerably less than fiber optic cable, making it a leading option for combination solutions which overcome CAT5 cable’s distance limitations.

In addition, CAT5 technology can be used in point-to-multi-point applications, allowing the broadcast of media content from one central source to hundreds of display stations. As a result, CAT5 technology alone or combined with fiber optic cable is an ideal solution for multiple-display digital signage installations.

Due to its network independence, CAT5 cable allows high performance, real-time transmission of high-resolution multi-media without slowdowns or downtime. If CAT5 technology is combined with a BIOS-level hardware solution for remote access over IP (such as a KVM IP extender), it can even allow remote maintenance and trouble shooting for the content server that manages the content to be displayed, minimizing down time and loss of investment.

CAT5 cable’s low expense, ease of installation, and flexibility make it a good choice for a primary distribution technology as well as a leading “last mile” option for combination platforms.

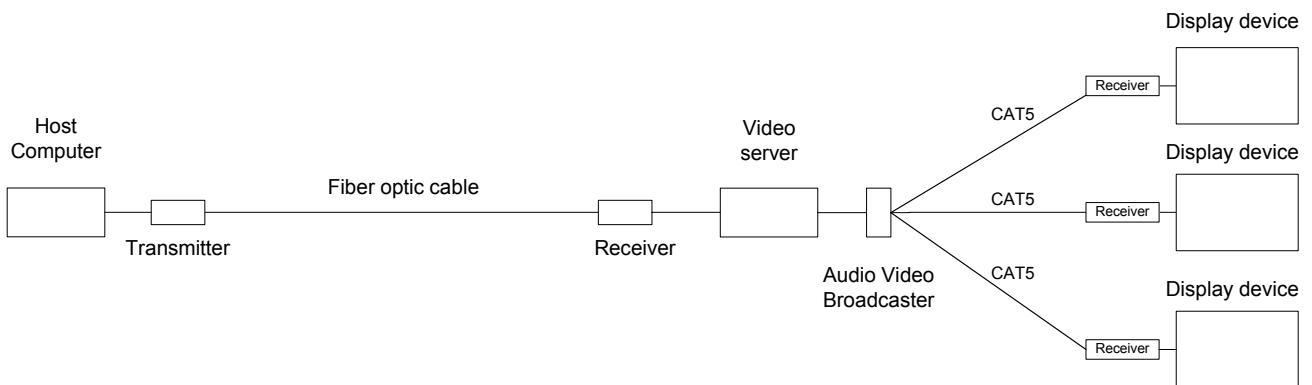
CAT5 distribution	
Benefits	Drawbacks
High resolution & performance	Distance limitations
Point to multi-point	
No special infrastructure required	
No display-side CPU or software required	
Network independent	
Low price	

4. Combination Technologies

Because of the advantages and drawbacks of each of the technologies listed above, it is frequently advisable to use a combination of technologies for optimal performance at the lowest possible cost.

4.1 Fiber optic and CAT5 cable

When dealing with high-resolution media over large distances that must be broadcast to a group of displays, a combination of fiber optic and CAT5 cable is the optimal solution. In this case, fiber optic cable is used for distance broadcasting together with a local CAT5 video broadcaster for “splitting” the broadcast to the various displays. This is a simple solution to install, since all that is needed is to connect the fiber optic receiver with the CAT5 video broadcaster. And the use of CAT5 cable for the last 50-150 meters/150-500 feet of cabling instead of fiber optic cable can provide significant savings.



Fiber Optic + CAT5 cable
Benefits
High resolution & performance
Hardware solution
Point to multi-point
No special infrastructure or display-side software required
Network independent
Long distance
Supports groups of displays
Lower cost than pure fiber optic solution

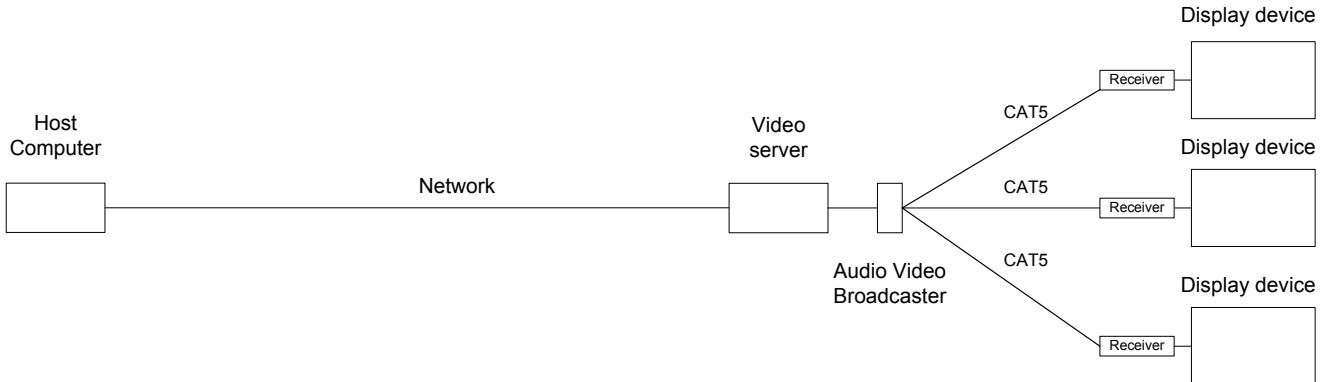
Cost comparison (part 1)		
	Hardware - Transmitter + Receiver	Cost of cable per 1m/3ft
Fiber optic (single mode)	\$4000	\$100
CAT5	\$400	\$10

Cost comparison (part 2)			
	Hardware - Transmitter + Receiver	Cost of cable (1000m/3300ft)	Total cost
Digital signage project with total cable distance of 1km/0.6 miles fiber only	\$4000	\$100,000	\$104,000
Digital signage project with fiber + CAT5 installed for last 150m/500ft	\$4000 \$400	\$85,000 \$1,500	\$86,500

Conclusion: By combining the two technologies into the same solution and using the true advantages of each type of cable you were able to save almost 17% or \$17,500 in direct costs to your customer.

4.2 Data Network and CAT5 cable

When managing multiple groups of digital signage displays from a remote location, a combination of data networking and local CAT5 cabling can give the user the best of both worlds: remote management over IP combined with low-cost and network-independent infrastructure. The “last mile” use of CAT5 in place of data networks at the display end saves the cost of a computer (or CPU) for every display. All that is needed is a local central server, which is remotely managed through the data network. The local server is connected to multiple displays through CAT5 technology, freeing the local installation from network dependence. The digital signage of each location is network-independent, and each installation is far less expensive to implement. Bandwidth issues are also surmounted by transmitting media to the local computer ahead of time for scheduling on-the-fly. At the time of broadcast, media is transmitted locally over CAT5 cabling, which is network independent and not limited by bandwidth.



Data Network & CAT5 cable
Benefits
Point to multi-point
High resolution & performance
No local infrastructure or display-side software required
Locally network independent
Low cost

5. Conclusion

Distribution infrastructure is an important part of digital signage, and choosing the correct distribution technology is a crucial element of any digital signage project. While each distribution technology has its advantages and drawbacks, the correct combination of technologies can achieve low cost and high performance no matter what the project size or complexity.

6. Minicom Video Distribution Systems for Digital Signage

As an innovator and market leader in Video-Over-CAT5 technology, Minicom offers an advanced **CAT5 Audio Video Display System** and a **CAT5 Video Display System** tailored for digital signage needs, as well as a wide variety of video extenders and splitters for optimal installation architecture.

6.1 The CAT5 Audio Video Display System (AVDS)

The **CAT5 Audio Video Display System (AVDS)** broadcasts high-resolution video and audio over CAT5 cable from a single A/V source to multiple display stations in real time, at a low overall cost. No special infrastructure or software is required. The system's standard CAT5 cabling lets you place the remote display stations up to 110m/360ft away from the A/V source.

The **CAT5 Audio Video Display System (AVDS)** provides:

- Video and audio distribution to hundreds of remote display devices at a competitive cost
- High resolution video: up to 1600x1200 @ 75 Hz
- Low cost of ownership
- Real-time video transfer
- Pure hardware solution: network independent and no resolution loss
- Advanced CAT5 technology: inexpensive, easy to install low-density cabling
- Easily expandable system: buy only what you need and add more as you require it
- Sturdy metal casing
- Switch between broadcast A/V reception and local A/V on local display screen
- 3 Year Warranty

6.2 The CAT5 Video Display System (VDS)

The **CAT5 Video Display System (VDS)** broadcasts high-resolution video over CAT5 cable to multiple display stations in real time. Any video content can be broadcasted directly to remote display stations up to 110m/360ft away from the source. Since the **CAT5 VDS** is a pure hardware solution it provides real time screen transfer without loss of screen quality, with a video resolution of up to 1600x1200 at 75Hz (depending on cable length).

The **CAT5 Video Display System (VDS)** provides:

- Video signal distribution to hundreds of remote display devices at a competitive cost
- Low cost of ownership
- High resolution video: up to 1600x1200 @ 75 Hz
- Real-time video transfer
- Pure hardware solution: network independent and no resolution loss
- Advanced CAT5 technology: inexpensive, easy to install low-density cabling
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- Sturdy metal casing
- 3 Year Warranty

6.3 Video Extenders and Splitters

Minicom's video extenders and splitters ensure an optimal CAT5 installation. The **CAT5 VGA Data Transmitter** provides point-to-point real-time video broadcasting, and Minicom's **CAT5 Video Splitter** and **AV Splitter** provide real-time audio/video broadcasting to multiple remote locations using cutting-edge CAT5 cable technology.

7. About Minicom Advanced Systems

Minicom Advanced Systems is a leading manufacturer of innovative A/V distribution solutions, KVM solutions, and Computer Based Training (CBT) systems. Minicom's sophisticated range of A/V – digital signage solutions include video splitters, broadcasters and extenders that help create futuristic visual displays.

As committed to state-of-the-art technology and innovation, Minicom led the CAT5 revolution that started over a decade ago and has proven success in being the first to introduce video and KVM distribution and control solutions over CAT5 cable for the AV and KVM markets. Minicom's long list of customers includes Applied Materials, Converse, Compaq-HP, France Telecom, HP, Israel Aircraft Industries, JP Morgan, Merrill Lynch, Nice, Nokia, Oracle Corp., Phillips, numerous Government and federal Agencies and Ministries of Education, Sony, Sprint, and the US Army.

For more information please visit us at www.minicom.com

