**Digital signage**

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Jump to: [navigation](http://en.wikipedia.org/wiki/Digital_signage#mw-navigation), [search](http://en.wikipedia.org/wiki/Digital_signage#p-search)

*Not to be confused with* [*Digital signature*](http://en.wikipedia.org/wiki/Digital_signature)*.*

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| http://upload.wikimedia.org/wikipedia/en/f/f4/Ambox_content.png | |  | | --- | | [[hide](http://en.wikipedia.org/wiki/Digital_signage)]**This article has multiple issues.** Please help [**improve it**](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit) or discuss these issues on the [**talk page**](http://en.wikipedia.org/wiki/Talk:Digital_signage). | | |  |  | | --- | --- | | http://upload.wikimedia.org/wikipedia/en/thumb/9/99/Question_book-new.svg/50px-Question_book-new.svg.png | This article **needs additional citations for verification**. Please help [improve this article](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit) by [adding citations to reliable sources](http://en.wikipedia.org/wiki/Help:Introduction_to_referencing/1). Unsourced material may be [challenged](http://en.wikipedia.org/wiki/Template:Citation_needed) and [removed](http://en.wikipedia.org/wiki/Wikipedia:Verifiability#Burden_of_evidence). *(September 2011)* |  |  |  | | --- | --- | | http://upload.wikimedia.org/wikipedia/en/f/f4/Ambox_content.png | This article **appears to be written like** [**an advertisement**](http://en.wikipedia.org/wiki/Wikipedia:NOT#SOAPBOX). Please help [improve it](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit) by rewriting promotional content from a [neutral point of view](http://en.wikipedia.org/wiki/Wikipedia:Neutral_point_of_view) and removing any inappropriate [external links](http://en.wikipedia.org/wiki/Wikipedia:EL). *(September 2011)* | | |



[http://bits.wikimedia.org/static-1.22wmf20/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Digital_sign_dearborn.ogv)

Digital sign video clip, [Dearborn, MI](http://en.wikipedia.org/wiki/Dearborn,_Michigan)

[](http://en.wikipedia.org/wiki/File:CKS_Terminal_1_FIDS.JPG)

[http://bits.wikimedia.org/static-1.22wmf20/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:CKS_Terminal_1_FIDS.JPG)

Digital signage as [flight information display system](http://en.wikipedia.org/wiki/Flight_information_display_system) at the [Taiwan Taoyuan International Airport](http://en.wikipedia.org/wiki/Taiwan_Taoyuan_International_Airport).

**Digital signs** are a form of electronic display that shows television programming, menus, information, [advertising](http://en.wikipedia.org/wiki/Advertising) and other messages. Digital signs (frequently utilizing technologies such as [LCD](http://en.wikipedia.org/wiki/LCD), [LED](http://en.wikipedia.org/wiki/LED), [plasma displays](http://en.wikipedia.org/wiki/Plasma_displays), or [projected images](http://en.wikipedia.org/wiki/Video_projector) to display content) can be found in both public and private environments, including retail stores, hotels, restaurants, and corporate buildings, amongst other locations.

[](http://en.wikipedia.org/wiki/File:Firefox_connection_failure_on_Park_and_Ride_bus_Cambridge.jpg)

[http://bits.wikimedia.org/static-1.22wmf20/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Firefox_connection_failure_on_Park_and_Ride_bus_Cambridge.jpg)

Digital sign running the [Firefox](http://en.wikipedia.org/wiki/Firefox) Web browser (identifiable by its connection failure message)

Digital sign displays are most commonly controlled by personal computers or servers, through the use of either [proprietary software](http://en.wikipedia.org/wiki/Proprietary_software) or [free software](http://en.wikipedia.org/wiki/Free_software); this approach often allows the operator to avoid large capital outlays for the controller equipment.

Advertising using a digital sign is a form of [out-of-home advertising](http://en.wikipedia.org/wiki/Out-of-home_advertising) in which video content, advertisements, and/or messages may be displayed on digital signs with a common goal of delivering targeted messages, to specific locations and/or consumers, at specific times. This is often called "digital out of home" or abbreviated as DOOH.[[1]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-1)

Since digital sign content may be both frequently and easily updated, saving the printing and/or construction costs associated with a static sign, and also because of the interactive abilities available through the accompanying employment of such real-world interfaces as embedded touch screens, movement detection and image capture devices, it has won wide acceptance in the marketplace.

**Contents**

 [[hide](http://en.wikipedia.org/wiki/Digital_signage)]

* [1 Market and applications](http://en.wikipedia.org/wiki/Digital_signage#Market_and_applications)
* [2 Content](http://en.wikipedia.org/wiki/Digital_signage#Content)
* [3 Technology](http://en.wikipedia.org/wiki/Digital_signage#Technology)
  + [3.1 Modular display construction](http://en.wikipedia.org/wiki/Digital_signage#Modular_display_construction)
  + [3.2 2D and 3D displays](http://en.wikipedia.org/wiki/Digital_signage#2D_and_3D_displays)
  + [3.3 Content playback and management - 2D & 3D](http://en.wikipedia.org/wiki/Digital_signage#Content_playback_and_management_-_2D_.26_3D)
  + [3.4 Network infrastructure](http://en.wikipedia.org/wiki/Digital_signage#Network_infrastructure)
  + [3.5 Other technologies](http://en.wikipedia.org/wiki/Digital_signage#Other_technologies)
* [4 Standards](http://en.wikipedia.org/wiki/Digital_signage#Standards)
* [5 Education](http://en.wikipedia.org/wiki/Digital_signage#Education)
* [6 Issues and progress](http://en.wikipedia.org/wiki/Digital_signage#Issues_and_progress)
* [7 See also](http://en.wikipedia.org/wiki/Digital_signage#See_also)
* [8 References](http://en.wikipedia.org/wiki/Digital_signage#References)
* [9 External links](http://en.wikipedia.org/wiki/Digital_signage#External_links)

**Market and applications[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=1" \o "Edit section: Market and applications)]**

While the term "digital sign" has taken hold throughout most of the world, some companies and organizations prefer to use the terms "[narrowcasting](http://en.wikipedia.org/wiki/Narrowcast)", "screen media", "place-based media", "digital merchandising", "digital media networks", "digital out-of-home" or "captive audience networks".[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)]

China currently leads the world in the number of digital sign displays deployed and number of [NASDAQ](http://en.wikipedia.org/wiki/NASDAQ) [IPOs](http://en.wikipedia.org/wiki/Initial_Public_Offering), with the country's biggest digital sign firm, [Focus Media Holding](http://en.wikipedia.org/wiki/Focus_Media_Holding), alone operating more than 120,000 screens. Total revenue from the digital sign equipment market in the United States – including hardware, software, installation, and maintenance—is expected to grow by about 33% in 2009.[[2]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-2) Another source for information on digital sign displays and impressions (the number of times a viewer reads/views digital sign), is a report provided by [Nielsen](http://en.wikipedia.org/wiki/Nielsen_Company), the "4th Screen Network Audience Report". In it Nielsen identifies that digital screens in the "fourth screen" category in the US generated over 237 million monthly exposures to persons 18+years or older,. The report identifies Screenvision, NCM, Capitvate, GSTV and IndoorDirect as among the companies that are leaders in the fourth screen category. One of the leading digital sign companies in movie theaters is Screenvision, with over 14,400 screens in the US; another leader in the "fourth screen" marketplace is [GSTV](http://en.wikipedia.org/w/index.php?title=GSTV&action=edit&redlink=1) (**Gas Station TV**), which reportedly generates over 32 million digital sign impressions every month. Nielsen estimates these 237 million+ exposures translate into more than half (54%) of the adult population being exposed to a place-based video ad during the period measured.[[3]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-3)

Digital signs are used for many different purposes and there is no definitive list. However, below are some of the most common applications of digital sign:

1. **Public information** – news, weather, traffic and local (location specific) information, such as building directory with map, fire exits and traveler information.
2. **Internal information** - corporate messages, such as health & safety items, news, and so forth.
3. **Menu information** – pricing, photos, ingredients, and other information about the food(s) being offered, including nutritional facts.
4. **Advertising** – usually either related to the location of the sign or using the audience reach of the screens for general advertising.
5. **Brand building** – in-store digital sign to promote the brand and build a brand identity.
6. **Influencing customer behavior** – directing customers to different areas, increasing the "dwell time" on the store premises, and a wide range of other uses in service of such influence.
7. **Enhancing customer experience** – applications include the reduction of perceived wait time in the waiting areas of restaurants and other retail operations, bank queues, and similar circumstances, as well as demonstrations, such as those of recipes in food stores, among other examples.
8. **Enhancing the environment** – with interactive screens (in the floor, for example, as with "informational footsteps" found in some tourist attractions, museums, and the like) or with other means of "dynamic wayfinding".

**Content[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=2" \o "Edit section: Content)]**

"Content", in the context of a digital sign, is the name used to describe anything designed and displayed on screens. Content is wide and varied, and indeed may be of any variety, including text, images, animations, video, audio, and interactivity. It has frequently been argued that a digital sign must rely on useful content if it is to work effectively.[[4]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-4)

While the technology is well-established, it is often the content that fails, perhaps because marketers have not yet widely adapted their thinking to produce appropriate and engaging content.[*[citation needed](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed" \o "Wikipedia:Citation needed)*]

Content design (much like the design for a static sign) is typically done through a specialist agency or, alternatively, by an "in-house" individual, team, or department. While there are a great number of different software solutions available, the most popular are proprietary to digital signs. The use of other systems to run a digital sign network often does not provide the necessary flexibility and management, as the proprietary software can create conflicts with open-source software.

In many digital sign applications, content must be regularly updated to ensure that the correct messages are being displayed. This can either be done manually as and when needed, through a scheduling system, using a [data feed](http://en.wikipedia.org/wiki/Data_feed) from a content provider (e.g. [Canadian Press](http://en.wikipedia.org/wiki/Canadian_Press), Data Call Technologies, [Thomson Reuters](http://en.wikipedia.org/wiki/Thomson_Reuters), [AHN](http://en.wikipedia.org/wiki/All_Headline_News), Screenfeed), or an in-house data source.[[5]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-5)

**Technology[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=3" \o "Edit section: Technology)]**

[](http://en.wikipedia.org/wiki/File:Digitalsignage.jpg)

[http://bits.wikimedia.org/static-1.22wmf20/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Digitalsignage.jpg)

Digital signage in the [Warner Village Cinemas](http://en.wikipedia.org/wiki/Warner_Village_Cinemas) in [Taipei](http://en.wikipedia.org/wiki/Taipei)

[](http://en.wikipedia.org/wiki/File:FarmaDigital.JPG)

[http://bits.wikimedia.org/static-1.22wmf20/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:FarmaDigital.JPG)

Digital signage in a pharmacy store

Digital signs rely on a variety of hardware to deliver the content. The components of a typical digital sign installation include one or more display screens, one or more [media players](http://en.wikipedia.org/wiki/Media_player_(application_software)), and a content management server. Sometimes two or more of these components are present in a single device but typically there is a display screen, a media player, and a content management server that is connected to the media player over a network. One content management server may support multiple media players and one media player may support multiple screens. Stand-alone digital sign devices combine all three functions in one device and no network connection is needed.

**Modular display construction[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=4" \o "Edit section: Modular display construction)]**

LED matrix displays often use modular display components, to allow for varying sizes and shapes of displays, and to make assembly and construction easier. A modular display consists of two parts:

* display matrix modules (8x8 pixels, 16x16 pixels, 8x16 pixels, etc.)
* display matrix controller

For example, a variable-size display may use modules 16 LEDs wide and 16 LEDs tall. To construct a display 64 pixels wide and 32 pixels tall, the display is built using a construct four modules wide and two modules tall. To correctly align the individual modules, either a support frame is used or the modules are joined together along the edges.

Matrix modules may be joined to the controller using individual data connectors, thereby limiting display area expansion to the total number of data connectors available on the controller, or the modules may communicate with the controller using a shared data bus, and the position of the matrix module to display its portion of the overall image is assigned via a data bus ID number or matrix position code.

Re-use of position/bus-ID codes allows for more than one matrix module to display the same information. In this manner a double-sided or quad-sided display can be constructed using a single matrix display controller, and reusing all module position/bus-ID codes on each face of the display.

In either case, unusual non-rectangular display shapes can be sometimes also be constructed by using the tiles in a free-form construction, skipping module locations in the matrix. Very large displays can be built to span across physical gaps in space where module mounting is otherwise impossible, but the disjointed modules still form a coherent image coordinated with other modules in the matrix.

Standard LCD or plasma video displays may also be combined in this manner using a special VGA matrix controller, but typically there is unusable display area around the perimeter of a standard LCD or plasma panel which cannot be hidden, so combined LCD panels tend to have the appearance of an image broken into tiles.

**2D and 3D displays[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=5" \o "Edit section: 2D and 3D displays)]**

Digital sign displays may be [LCD](http://en.wikipedia.org/wiki/LCD) or [plasma](http://en.wikipedia.org/wiki/Plasma_display) screens, [LED](http://en.wikipedia.org/wiki/LED) boards, projection screens or other emerging display types like interactive surfaces or organic LED screens ([OLEDs](http://en.wikipedia.org/wiki/Organic_light-emitting_diode)). New technologies for digital sign are currently being developed, such as three-dimensional (3D) screens, with or without 3D glasses (see [Anaglyph image](http://en.wikipedia.org/wiki/Anaglyph_image) and [Autostereoscopy](http://en.wikipedia.org/wiki/Autostereoscopy)), '[holographic displays](http://en.wikipedia.org/wiki/Computer_generated_holography)',[[6]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-6) water screens and fog screens.[[7]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-7)

The first 3D flat screens that do not need glasses ([autostereoscopy](http://en.wikipedia.org/wiki/Autostereoscopy" \o "Autostereoscopy)) were introduced in 2010 by [Sharp](http://en.wikipedia.org/wiki/Sharp_Corporation), and in 2011 by [Toshiba](http://en.wikipedia.org/wiki/Toshiba).

Due to cost issues, many of these newer technologies have as yet only been employed for smaller "one-off" installations, rather than for large displays or networks.

Rapidly dropping prices for large plasma and LCD screens have led to a growing increase in the number of digital sign installations.[[8]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-8) Another price-related benefit that is allowing a larger group of businesses to install digital signs is the increasing availability of newer LCD and plasma display brands in the market. Many users have opted to forgo more expensive brand-name displays in favor of more affordable displays from less well-known companies.[*[citation needed](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed" \o "Wikipedia:Citation needed)*]

**Content playback and management - 2D & 3D[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=6" \o "Edit section: Content playback and management - 2D & 3D)]**

Digital audiovisual (av) content is reproduced on TVs and monitor displays of a digital sign network from at least one media player (usually a small computer unit, but [DVD players](http://en.wikipedia.org/wiki/DVD_player) and other types of media sources may also be used). Various hardware and software options exist, providing a range of different ways to schedule and playback content. These range from simple, non-networked [portable media players](http://en.wikipedia.org/wiki/Portable_media_players) that can output basic [JPG](http://en.wikipedia.org/wiki/JPG) slide shows or loops of [MPEG-2](http://en.wikipedia.org/wiki/MPEG-2) video to complex networks consisting of multiple players and servers that offer control over enterprise-wide or campus-wide displays at many venues from a single location. The former are ideal for small groups of displays that can be updated via [USB flash drive](http://en.wikipedia.org/wiki/USB_flash_drive), [SD card](http://en.wikipedia.org/wiki/SD_card) or [CD-ROM](http://en.wikipedia.org/wiki/CD-ROM). Another option is the use of D.A.N. (Digital Advertising Network) players that connect directly to the monitor and to the internet, to a [WAN](http://en.wikipedia.org/wiki/Wide_area_network) (Wide Area Network), or to a [LAN](http://en.wikipedia.org/wiki/LAN) (Local Area Network). This allows the [end user](http://en.wikipedia.org/wiki/End-user) the ability to manage multiple D.A.N. players from any location. The end user can create new advertising or edit existing advertisements and then upload changes to the D.A.N. via the internet or other networking options.

Developments in web services have meant the [APIs](http://en.wikipedia.org/wiki/Application_programming_interface) for some digital sign software now allow for customized content management interfaces through which end-users can manage their content from one location, in a way which suits their requirements.

More advanced digital sign software allows content to be automatically created by the media players (computers) and servers on a minute-by-minute basis, combining real-time data, from news, to weather and prices, transport schedules, etc., with av content to produce the most up-to-date content.[[9]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-9)

**Network infrastructure[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=7" \o "Edit section: Network infrastructure)]**

Whenever the display, media player and content server are located apart there is a need for audio-video wiring between the display and the media player and between the media player and the content server. The connection from media player to display is normally a [VGA](http://en.wikipedia.org/wiki/VGA), [DVI](http://en.wikipedia.org/wiki/DVI), [HDMI](http://en.wikipedia.org/wiki/HDMI) or [Component video](http://en.wikipedia.org/wiki/Component_video) connection. Sometimes this signal is distributed over [Cat 5 cables](http://en.wikipedia.org/wiki/Category_5_cable) using transmitter and receiver [baluns](http://en.wikipedia.org/wiki/Balun) allowing for greater distances between display and player and simplified wiring. The connection from media player to content server is usually a wired [Ethernet](http://en.wikipedia.org/wiki/Ethernet) connection although some installations use wireless [Wifi](http://en.wikipedia.org/wiki/Wifi) networking.

To manage a network, a management server is usually required. This can be located anywhere, so long as it is connected to the digital sign network. New content will be managed and organized here, while the actual content itself is stored and played on the player servers. Digital sign networks can either be closed or open to the web, which will affect how the content on the screens is updated. For closed networks (without Internet access), updates need to be done locally through [USB](http://en.wikipedia.org/wiki/USB) sticks, [DVD](http://en.wikipedia.org/wiki/DVD) drives or other 'onsite' updates. Open networks (with Internet access) can be updated remotely and stream data from other Internet sources (such as [RSS](http://en.wikipedia.org/wiki/RSS) feeds). The availability and type of Internet access (wireless, broadband, etc.) depends on the location and client.[[10]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-10)

Technologies such as [IPTV](http://en.wikipedia.org/wiki/IPTV) allow digital sign to be used as a method of broadcasting. Convergence (telecommunications) between digital sign and broadcasting allows for real-time distribution of broadcast sources (TV) on a narrowcast network (digital sign). An example of this is the [TelVue Corporation](http://en.wikipedia.org/wiki/TelVue_Corporation), a digital media company that has deployed its WEBUS community bulletin board (CBB) digital sign systems to a network of municipally owned [public, educational, and government access](http://en.wikipedia.org/wiki/Public,_educational,_and_government_access) (PEG) channels on [cable television](http://en.wikipedia.org/wiki/Cable_television). The content is played according to instructions provided by play lists created by a [broadcast programming](http://en.wikipedia.org/wiki/Broadcast_programming) system and the [playout](http://en.wikipedia.org/wiki/Playout) of content is controlled by a [broadcast automation](http://en.wikipedia.org/wiki/Broadcast_automation) system.

Small, localized, digital sign networks can be amalgamated to form larger networks that span wider geographic areas. Specific time slots on the displays can be sold off to advertisers, for example via auction. This concept is known as a digital sign exchange. [[11]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-11)[[12]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-12)

**Other technologies[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=8" \o "Edit section: Other technologies)]**

Digital sign can interact with mobile phones. Using [SMS](http://en.wikipedia.org/wiki/Short_message_service) messaging and [Bluetooth](http://en.wikipedia.org/wiki/Bluetooth), some networks are increasing the interactivity of the audience. SMS systems can be used to post messages on the displays, while Bluetooth allows users to interact directly with what they see on screen. In addition to mobile interactivity, networks are also using technology that integrates social and location-based media interactivity. This technology enables end users to send [Twitter](http://en.wikipedia.org/wiki/Twitter) and [Flickr](http://en.wikipedia.org/wiki/Flickr) messages as well as text messages to the displays. Some signs use [3D displays](http://en.wikipedia.org/wiki/3D_display) that operate using autostereoscopy, which allow the viewer to see a 3D image without using special glasses.

**Standards[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=9" \o "Edit section: Standards)]**

The [ITU](http://en.wikipedia.org/wiki/ITU) published a whitepaper [[13]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-13) in which [SMIL](http://en.wikipedia.org/wiki/Synchronized_Multimedia_Integration_Language) is cited as "a key standard for the digital sign industry," and that SMIL "is increasingly supported by leading digital sign solution providers." It is reported [[14]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-14) that SMIL players are deployed for nearly 100,000 screens in year 2011, and a single software maker has won three major projects each deploying more than 1,000 SMIL players in the same period.

[POPAI](http://en.wikipedia.org/wiki/POPAI) has released several digital sign standards [[15]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-15) to promote "interoperability between different providers". The objective of these standards documents is to establish a foundation of performance and behavior that all digital sign systems can follow. The current set of standards published by POPAI are:

* "Screen-Media Formats" specifies the file formats that digital sign systems should support.
* "POPAI Digital Sign Device RS-232 Standards"
* "POPAI Digital Sign Playlog Standards V 1.1"
* "Digital Control Commands"
* "Industry Standards of Digital Sign Terms"

**Education[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=10" \o "Edit section: Education)]**

Industry education has been limited, but more options are becoming available. At least one firm, Platt Retail Institute, offers formal education programs, and provides various research reports (such as the North American Digital sign Index and the Journal of Retail Analytics, among others), as well as a searchable article library. Another option is manufacturers that offer technology focused training (firms such as Black Box Network Solutions and Ingram Micro). Several other firms offer introductory courses and [IT](http://en.wikipedia.org/wiki/Information_technology)-based training as well. In 2009, [Texas State Technical College](http://en.wikipedia.org/wiki/Texas_State_Technical_College) created an associate’s degree in Digital Signage Technology, using their [Second Life](http://en.wikipedia.org/wiki/Second_Life) delivery system. In 2013, **The Guide to Dynamic Digital Communication** was authored by eighteen industry experts. This 1,000 page book is designed to become the definitive guide to the industry. [Additional information](http://tgddc.com/info.html)

**Issues and progress[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=11" \o "Edit section: Issues and progress)]**

Digital sign in the broad sense has been in use for decades in the form of LED ticker signs and LED video walls. However, despite its recent growth it has yet to become a major public medium, due in part to the following negative factors:

1. **Uncertain** [**ROI**](http://en.wikipedia.org/wiki/Return_on_investment) – the costs of deploying digital sign can be high. Large outdoor screens are expensive - but the much more common, and much cheaper, digital signs based on LCD screens can still represent a significant investment when a large network is planned: the cost of installing one screen in, say, each restaurant in a large fast-food chain could run to millions of dollars. An investment of this magnitude has to be justified by a clear ROI plan before receiving approval.
2. **Lack of interoperability** – digital sign products today are mostly closed, proprietary systems. It is difficult to advertise across digital sign networks running different solutions, making the emerging media inferior to nationwide advertising media such as television and the Internet. Due to the lack of a common communication protocol, products from different vendors do not mix, making digital sign systems expensive to build and hard to expand.
3. **Complex value chain** - a digital sign network can involve at least the following vendors: displays, media player, management software, project planning, installation, field service, network connectivity, bandwidth, content creation, and advertising sales. Managing such a complex value chain is a daunting task and all parties involved may introduce risk factors to fail a project.
4. **Lack of understanding** - despite considerable media coverage there remains a general lack of understanding about the requirements for the successful use of digital sign. Problems arising from this include poor content and improper type or location of screens.

These issues are being addressed today in the following ways:

1. **Understanding the ROI** – studies have shown digital sign to be effective in aiding customer recall and retention of displayed information[[16]](http://en.wikipedia.org/wiki/Digital_signage" \l "cite_note-16) in large-scale merchandising applications, especially taking into account the downward trend in LCD panel and playback device prices. Today a small-scale retail or restaurant digital sign installation can be implemented for just $1,500-2,000 using inexpensive [SaaS](http://en.wikipedia.org/wiki/Software_as_a_service) tools, and ROI may be realized quickly. One of the best ways to make the case for implementing a digital strategy is to calculate the ROI or ROO upfront. Determine what the goals and objectives are for the digital sign – is it to increase sales at point of purchase? Can it be used to improve lead generation or build brand awareness? Thus, knowing how to calculate the ROI of digital sign [[17]](http://en.wikipedia.org/wiki/Digital_signage#cite_note-17) is very important.
2. **Open standards for digital sign** – industry organizations including [POPAI](http://en.wikipedia.org/wiki/POPAI) (Point-of-Purchase Advertising International) and OAAA ([Outdoor Advertising Association of America](http://en.wikipedia.org/wiki/Outdoor_Advertising_Association_of_America)) are actively developing and promoting technical standards that will make it possible to communicate across digital sign networks made by different vendors. Interoperability across systems and media players is increasing competition in the supply chain, significantly lowering costs and making the ROI on building networks vastly more attractive.
3. **Value chain consolidation** - business entities have been formed to consolidate segments of the long value chain. Display units with built-in media players, content design agencies which also provide hardware and support, as well as management software which allows advertisers to manage a whole sign network are examples of how the industry is coming to work together and consolidate.
4. **Understanding the industry** - there are a significant number of trade shows with conferences as well as specialized conferences and also more informal training and briefing sessions all focused on aspects of digital sign. There are also more user friendly products available which are [plug and play](http://en.wikipedia.org/wiki/Plug_and_play) and don’t even require scheduling software.

**See also[[edit](http://en.wikipedia.org/w/index.php?title=Digital_signage&action=edit&section=12" \o "Edit section: See also)]**

* [Kiosk software](http://en.wikipedia.org/wiki/Kiosk_software)
* [Retail media](http://en.wikipedia.org/wiki/Retail_media)
* [Electronic signage](http://en.wikipedia.org/wiki/Electronic_signage)
* [Fifth screen](http://en.wikipedia.org/wiki/Fifth_screen)
* [Emergency communication system](http://en.wikipedia.org/wiki/Emergency_communication_system)

**CAMouFLAGE MEDIA, Uganda**

The firm provides digital screens for corporate clients which can be seen in Kampala's supermarkets, shops and corporate lobbies. It also offers social media services by managing companies' online presence and growing their fan base.

"Advertising in general was an area of interest" says Matthew Kabonero. "The idea to make it digital was because of the missed opportunity we saw in areas where static adverts were not effective enough to gather interest, for example at waiting areas of an office reception.

"With print, you have to print newspapers every day, but with digital advertising it's just a matter of changing the content that you have and distributing it online, so the expense of having to go through the printing is minimized,