

# Trends in Digital Signage Solutions

OOSAKA Tomoyuki

## Abstract

The use of digital signage has been increasing recently. This paper describes the general architecture of digital signage and the functions required for the distribution server and signage terminals respectively. It also reports on the technological issues of digital signage and the trends that accompany its standardization, and introduces the types of digital signage solutions targeted by the NEC Corporation.

## Keywords

digital signage, architecture, standardization

## 1. Introduction

Readers may recently have had more opportunities than previously to see the impact of digital signage in their daily lives (stations, stores, public facilities, hospitals, etc.).

In this paper, in section 2 we discuss the system configuration of digital signage and in section 3 the necessary functions and technologies required to implement them. We also report on the technological issues of digital signage in section 4 and about standardization trends in section 5.

## 2. System Configuration of Digital Signage

In this section, we deal with the system configuration of popular digital signage. As shown in **Fig. 1**, a digital signage system is composed of the distribution/content servers, signage terminals (including displays) and a management terminal. The displayed content files and the schedule information are edited at the management terminal. Data is stored in the distribution server and distributed to the signage terminals. Each signage terminal reproduces the contents according to the

schedule specified for it and uploads the display results to the distribution server.

## 3. Functions of Digital Signage

This section deals with the main functions necessary for implementing the digital signage system (**Fig. 2**).

### 3.1 Content Management

The CMS (Content Management System) requires a function for registering/changing contents, another for managing metadata accompanying the contents and a schedule management function that defines the content to be displayed on each panel.

The DRM (Digital Rights Management) function may also be necessary depending on the handled contents.

### 3.2 Signage Terminal Management

It is also necessary to manage the IP addresses and location information of the signage terminals as the destinations of

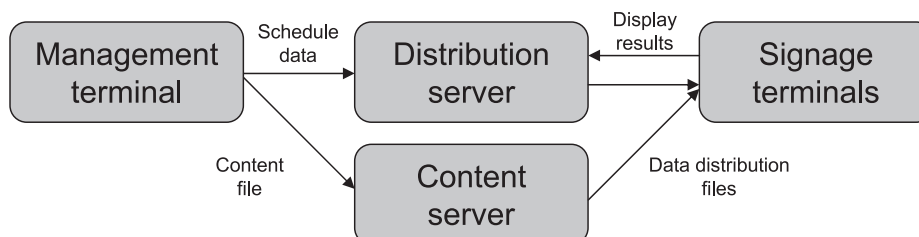


Fig. 1 Digital signage system configuration.

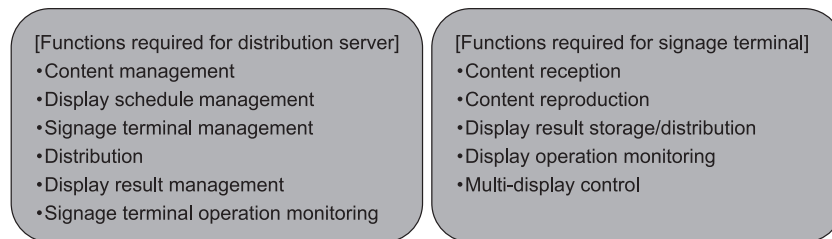


Fig. 2 Functions required for signage system.

distribution at the same time as monitoring the signage terminal operations and managing the display results.

### 3.3 Content Distribution

#### (1) Classification based on distribution leadership

The following two configurations are possible for content distribution.

- **Push-type distribution**

A push-type system distributes the contents to be distributed and their reproduction schedules to the signage terminals as needed by the distribution requests generated by the distribution server.

- **Pull-type distribution**

A pull-type system inquires of the server if there is data to be downloaded (distributed) at the timing at which a signage terminal is ready for downloading. If data to be downloaded is present, the system downloads it to the terminal. The two service patterns described above are sometimes combined in a service in which the information display is updated in real time (e.g. performing pull-type distribution of only the updating differences while performing push-type distribution for emergency information).

#### (2) Movie distribution methods

Movies can be distributed by either streaming or storage/reproduction. Considering the possibility of instability of content reproduction depending on the bandwidth and quality of the network arrangement, the current mainstream is the storage/reproduction type that stores contents at each signage terminal and reproduces them as required.

#### (3) Distribution protocols

- **Unicast**

This method opens a one-to-one communication session between the server and player and performs direct communication between them. The representative protocols include HTTP and FTP.

- **Multicast**

Stream distribution and data storage/distribution using the multicast method is effective when distributing contents to multiple signage terminals installed at distributed locations. The multicast method features simultaneous distributions to multiple locations while utilizing the network bandwidth efficiently. However, this method is for the present not widely adopted due to problems such as the ineffectiveness in distributing various contents to different signage terminals and the high cost required for the network construction.

### 3.4 Signage Terminals

The minimum function required for each signage terminal is to receive (download) the necessary content files and display schedule information and to reproduce the contents as scheduled.

In addition, there are some desirable functions including the one for storing the display results and uploading them to the server and, more recently, the function for controlling a multiple-display panel.

## 4. Technological Issues for Digital Signage

### 4.1 Content Distribution

Unlike ordinary broadcasting, digital signage is required to distribute various contents to different locations. However, as a result of the growth of the market, the number of distribution destinations has increased, thereby causing cost as well as distribution performance issues for the traditional centralized type distribution. A new mechanism is now awaited that is capable of distributing various contents to multiple locations quickly, such as the managed P2P method.

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In addition, the current mainstream of content storage/reproduction at signage terminals is also required to shift toward a streaming type operation. This will eliminate the need for content distribution and is therefore expected to reduce the signage terminal hardware cost and to improve the image quality due to the fact that there is no further need for a HDD. However, to disseminate the streaming type operation, provision of a stable network with guaranteed bandwidth is necessary.

### 4.2 Content Reproduction

The advance in image quality of content and progress in multi-display technology has enabled the display of high-resolution images combining the full HD technology. As this trend has led to a ballooning of the content size, it is desirable to prepare a codec with higher compression rates and a new distribution method. In addition, the performances of the terminals displaying the contents are sometimes unable to catch up with the speed of change, thereby making it impossible to adopt full use of a large display space such as a 4-screen or a 9-screen multi-display panel. This issue needs to be solved by further enhancement of the graphic accelerator.

## 5. Standardization Trends of Digital Signage

The current absence of standards for digital signage is caus-

ing problems such as the impossibility of providing content distribution between different systems and differences in displayable content types between signage terminals. To deal with these issues, consortiums have been established in the USA, Europe and Japan that aim to expand the digital signage markets, and studies attempting to deal with standardization have already begun at ITU-T and W3C.

- **DPAA (Digital Place-based Advertising Association: USA)**

This organization was established in 2006 by adding advertising agencies and location owners to the OVAB (Out-of-home Video Advertising Bureau) that was previously organized mainly by the vendors. Its program includes promotion of digital signage advertising and definitions of guidelines.

- **OVAB-E (Out-of-home Video Advertising Bureau Europe: Europe)**

This organization was established as the European branch of the OVAB of the USA in 2008. The objectives were expansion of the digital signage/media market and information sharing within Europe.

- **DSC (Digital Signage Consortium: Japan)**

This organization was established to solve issues facing the digital signage industry, to create new markets and improve the value of digital signage. It is participated by a broad range of members including vendors, advertising agencies, content producers and service providers.

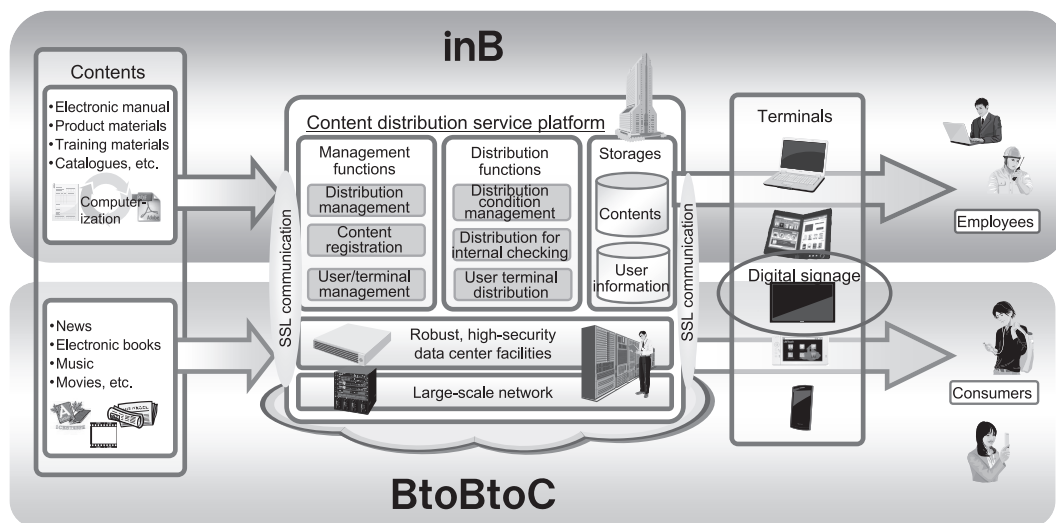


Fig. 3 Content distribution business targeted by NEC.

## 6. Digital Signage Targeted by NEC

In such market conditions NEC has set digital signage as part of its content distribution business by targeting the distribution of various contents to different terminals ( **Fig. 3** ). We intend not only to distribute content to digital signage terminals installed in public locations, but also in an integrated manner to other terminals including the rapidly disseminating smartphone/tablet terminals and PCs. For the distributed content, we will enable integrated management of the contents posted by several sources, from the information oriented inside an enterprise to general information including news and weather forecasts, as well as entertainment information on music, movies and advertising.

## 7. Future Perspectives of Digital Signage

In the future, we expect that the dissemination of digital signage will be accelerated by the introduction of technical innovations in hardware and networks, as well as by further price reductions and standardization advancements.

Furthermore, we firmly believe that the content distribution service via multi-terminals in combination with the rapidly disseminating smartphone/tablet terminals will expand the market substantially.

### Author's Profile

#### OOSAKA Tomoyuki

Group Manager  
Telecom and Contents Solutions Division  
Carrier and Media Solutions Operations Unit

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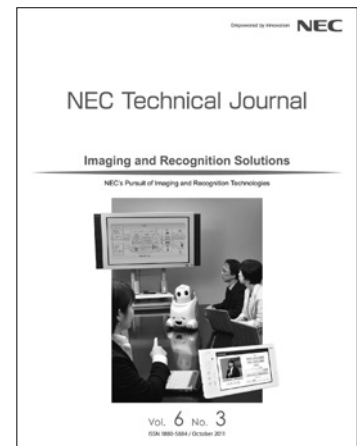
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