

# Integrated Information Service for Digital Signage

## Content Delivery Using IoT and AI

The digital signage market is characterized by growth in the number of screens and areas where signage units are installed. Hitachi has launched a service for this market that not only reduces workloads but also provides flexible and reasonable distribution of content in a timely manner. Through the real-time collection and analysis of sensor information from security cameras, point of sale systems, and IoT devices, the service delivers content to digital signage units, smartphones, and so on that is tailored to the time and place. It also utilizes Hitachi artificial intelligence technology to achieve optimal content distribution in a timely manner.

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### 1. Introduction

The digital signage market is anticipating considerable growth in the future due to factors that include the replacement of posters and other analogue media with electronic devices, its utilization for maintaining safety and security in the event of a disaster, and in preparation for the arrival of overseas visitors in Japan for the international sports events in 2020. Meanwhile, use of digital signage is increasing in urban areas, and this is creating a pressing need for solutions that can manage content distribution effectively and efficiently and reduce administration costs for the owners of sites where large numbers of units are deployed. Also essential is the effective and timely provision of information in response to societal issues that include an aging population and the information divide between urban and rural areas.

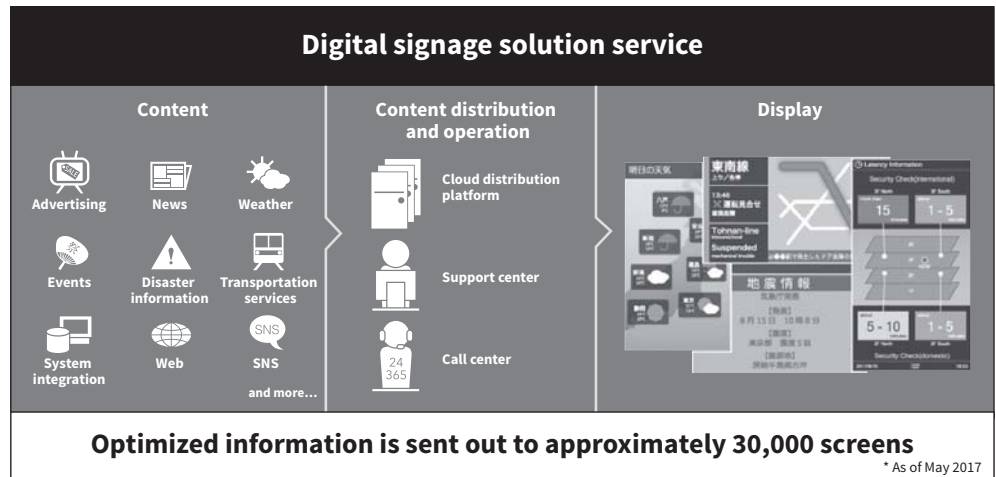
To overcome these challenges, Hitachi is seeking to collect and utilize information automatically from cameras and other sensors installed in the vicinity of digital signage units, and also other information from social networking services (SNSs) and the weather and traffic conditions in the area. What this means in practice is providing an integrated information service that uses artificial intelligence (AI) to identify, on the basis of this collected information, where best to send different content depending on the information it contains and on the objectives set by the content distributor.

### 2. Overview of Digital Signage

“Digital signage” refers to systems that use screens and other digital technology to display information at a variety of locations, including outdoors, in shops, and at transportation services or other public places.

**Figure 1 — Overview of Digital Signage Solution Service**

Along with operating as a signage platform, the digital signage solution service also provides content delivery, operational support, system monitoring, and content distribution services.



Dramatic progress in fields like large-screen displays and network technology is being accompanied by a recognition of the value to digital signage of techniques for distributing and displaying content at the desired time and place, with such practices experiencing rapid uptake.

As an out-of-home medium, digital signage is also recognized as a new vehicle for advertising that offers an alternative to television, radio, and newspapers.

## 2. 1

### Hitachi's Digital Signage Platform

One example of digital signage within Hitachi is the solution from Hitachi KE Systems, Ltd. This operates around 30,000 screens in Japan across a variety of industries, including transportation, retail, and finance and provides a highly reliable multi-purpose platform as a cloud service (see **Figure 1**).

## 2. 2

### Challenges of Digital Signage

Once installed, digital signage needs to be continually updated with content. The operation of digital signage used for advertising in particular requires the meticulous undertaking of complex and burdensome tasks. This includes:

- Content development spread across different departments
- Content vetting and approval
- Designation and management of where and when to display content

In addition to these tasks, things like preparing different versions of content to suit different types of

screen also add to the workload. Moreover, because the market uptake of digital signage has been so rapid, the workload of site owners and operators is rising due to factors such as the increasing number of screens to be managed and the emergence of different forms of digital signage.

## 3. Implementation of Integrated Information Service

The integrated information service enables more efficient operation by reducing the complexity and hassle of operating digital signage.

The service is made up of the following four parts (see **Figure 2**).

- Intelligent content management system (CMS)
- Central distribution platform
- Functions for collecting, analyzing, and utilizing data
- Scene-optimized distribution

## 3. 1

### Intelligent CMS

Hitachi supplies a CMS that is equipped with workflow functions that are used across a variety of different operations in the day-to-day running of digital signage. This is called an "intelligent CMS."

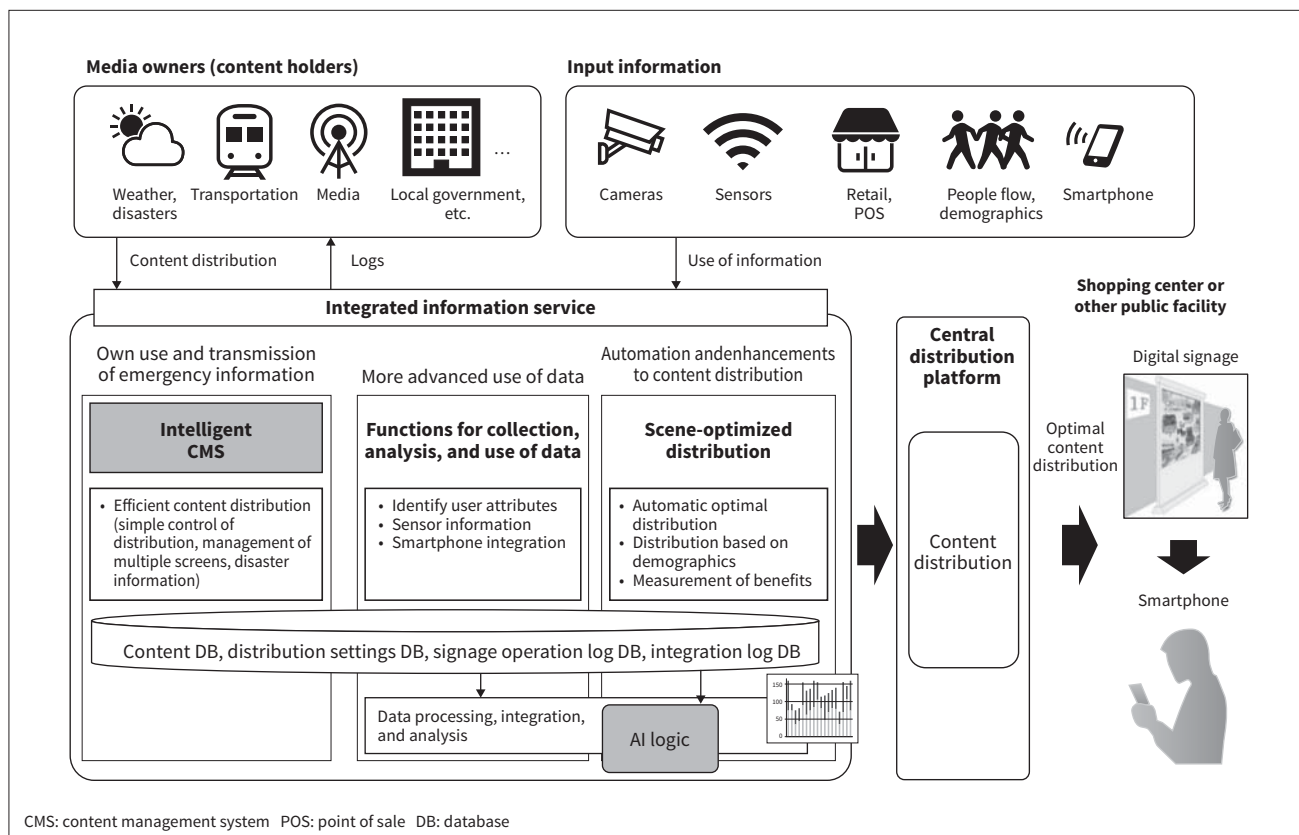
#### (1) Display planning

The intelligent CMS provides functions for display planning that allow signage operators to undertake scheduling and grouping based on site characteristics in a flexible manner.

It is possible, for example, to produce display plans that efficiently match content to the people who will

**Figure 2 — Overview of Integrated Information Service**

Content suitable for time and place is sent out to signage units, smartphones, and other devices based on the real-time collection and analysis of information from security cameras, retail POS, SNS posts, weather reports, and on-site sensors. The service utilizes Hitachi artificial intelligence (AI) technology to provide the right content to suit different places in a timely manner.



view it by first grouping signage locations based on the attributes of the people found there, such as sites where large numbers of commuters pass in the morning and evening, or locations where family groups tend to gather during the lunch hour.

## (2) Content display scheduling

This function manages where, when, and for how long to display content. Standard practice for large digital signage units is to divide content up by category and company and to manage display slots accordingly.

The function is able to assign fine-grained authority to schedulers and managers based on operating practices. This enables highly efficient operation by splitting up the work based on the respective organizational structures and levels of authority.

If display slots are to be used for advertising, an advertiser or advertising agency is able to reserve and manage slots on its own for its advertising.

## (3) Content registration, vetting, and distribution

This defines a workflow for content registration and distribution whereby the content must be vetted

(approved) prior to distribution. Vetting is provided as a function for improving the trustworthiness of digital signage by preventing the distribution of inappropriate material.

## (4) Emergency content distribution

In the event of a disaster or other emergency, the intelligent CMS replaces the content scheduled for display on digital signage with disaster warnings and mitigation messages or information such as the location of emergency exits or how to get to evacuation sites.

### 3.2

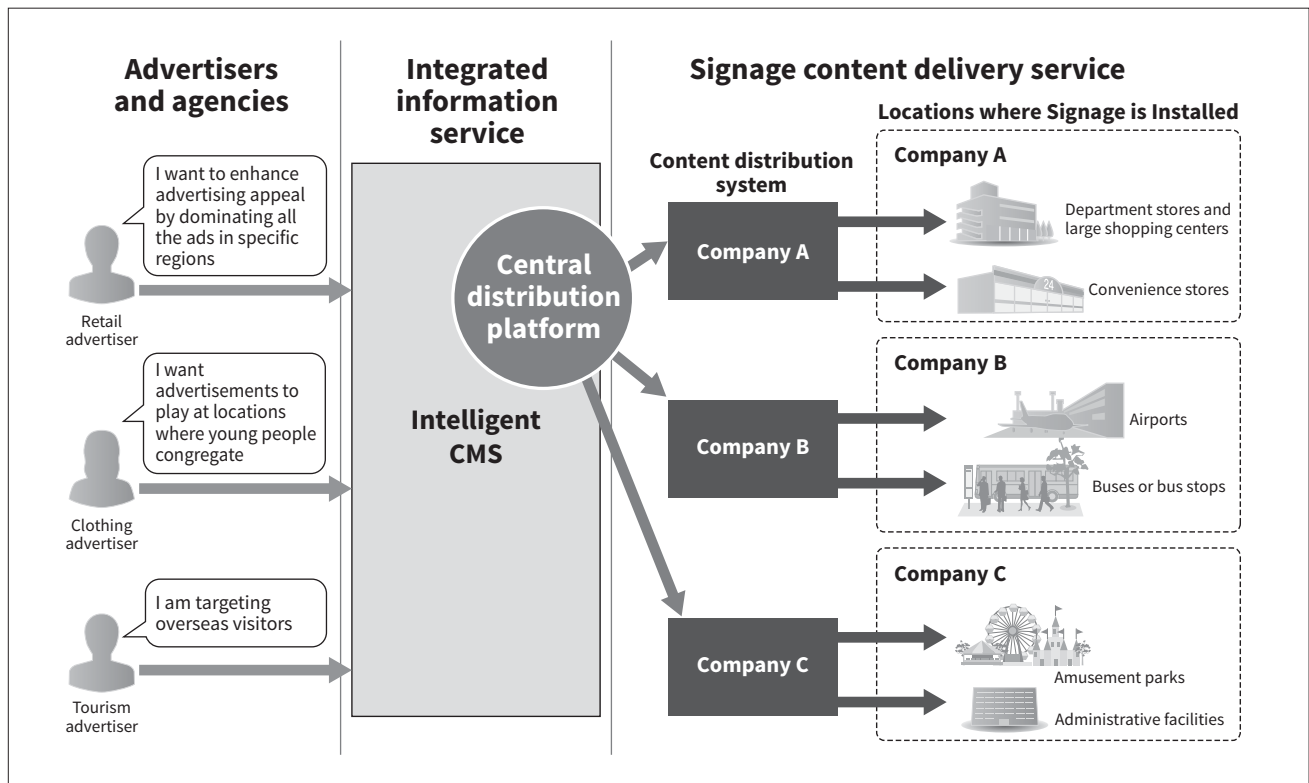
#### Use of Central Distribution Platform for Simultaneous Broadcast

The central distribution platform runs on the cloud and serves as an interface for linking the integrated information service to digital signage distribution systems with different specifications.

The central distribution platform can broadcast content simultaneously to multiple different types

**Figure 3 — Overview of Central Distribution Platform**

An unprecedented multi-vendor content distribution system is made possible through interoperation with the companies involved in the system.



of digital signage. By consolidating the task of sending content to different types of digital signage and enabling distribution to be done efficiently and in real time, this allows site owners to operate digital signage in ways that were not previously possible (see **Figure 3**).

### 3.3

#### Use of IoT Devices for Collecting, Analyzing, and Utilizing Data

Linking digital signage together with Internet of Things (IoT) devices has the potential to improve performance such as the practical evaluation of display effectiveness or providing more extensive services. As a result of dramatic improvements in the temporal and spatial resolution of cameras and other sensors and the analytical capabilities of software, it is becoming possible to make more effective use of data by identifying the performance of digital signage and how it is used at the installation location.

(1) Use of cameras and other sensors to measure effectiveness

By using cameras and other sensors to record information about what is happening around digital

signage, it is now possible to measure the number of people passing by and collect a wide variety of behavioral information, including identifying attributes such as age and gender, tracking their movements, identifying their choice of products placed nearby and purchasing actions, and measuring how long they spend looking at the signage. The continuous collection of this information can provide evidence of the actual effectiveness of digital signage.

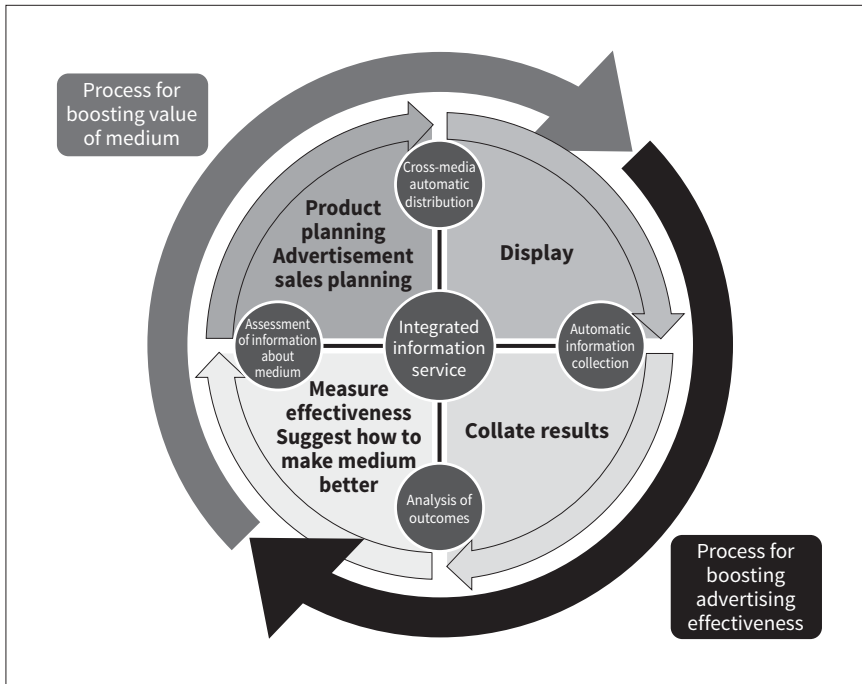
(2) Point of sale (POS) integration

Linking retail POS information to the digital signage installed in-store opens up the possibility of performing analyses such as the relationship between the content displayed on digital signage and the purchasing behavior of shoppers. This is particularly useful for things like measuring the effectiveness of advertising content.

(3) Smartphone integration

Smartphone integration can be achieved by equipping digital signage units with IoT devices such as sensors or transmitters. A wide variety of methods already exist for achieving this integration, with Wi-Fi\* routers, near-field-communication (NFC) sensors, and barcode displays being among the IoT

\* Wi-Fi is a registered trademark of Wi-Fi Alliance.



**Figure 4 — Service Cycle Intended for Integrated Information Service**

A content distribution service with higher added value that is able to grow can be created through an organic combination of signage with AI and sensors.

devices available. Audio devices such as microphones and speakers can also be used for this purpose.

This provides a way to link digital signage to applications that have already been downloaded to people's smartphones, enabling information transfer in such a way that people can take the information delivered via digital signage away with them, such as coupons or information on events.

#### (4) SNS integration

By identifying and collating votes or other recommendations relating to content that appears on digital signage units or to the stores in which they are installed, it is possible to measure the effectiveness of digital signage installation, awareness of the signage, and the promotional benefits of content distribution.

### 3.4

#### Scene-optimized Distribution and Use of the IoT and AI

The service utilizes the IoT and AI to perform tasks such as the collection and analysis of information about the times and places where digital signage is located, display content, and the consequent actions of the people who view the signage obtained from POS or SNS data, and provides functions for service operators that include automatic distribution and suggesting where best to display content and under what conditions (see **Figure 4**).

#### (1) Scene-optimized distribution

Because viewer demographics often vary depending on where digital signage is installed and when content is displayed, a function is provided that suggests where to display content such that there will be a high degree of relevance between the content and the attributes of the people around the signage, and also distributes content automatically.

#### (2) Content analysis

Using techniques for analyzing the displayed images, the service can identify inappropriate material and suggest not to distribute this material. It also uses an analysis function to identify the impression conveyed by particular content (such as whether it is enjoyable, soothing, or disturbing) and attach meta-data accordingly.

The function can also report on evaluation results, such as whether particular content has a strong or weak appeal, based on the comparison of content and effectiveness measurements.

#### (3) Recommendations on where to install

As a result of its operating a number of digital signage units, the service identifies and highlights things like what makes particular digital signage units better or worse than others and where improvements can be made through ongoing measurement of the effectiveness of content delivery and other parameters as well as comparisons between data for different signage units.

## 4. Conclusions

Retailing is being driven by the megatrend of digital transformation in which all sorts of different “goods” are being transformed into services as a result of the changes in the industry resulting from the emergence of electronic commerce (EC) for consumer goods.

On the other hand, a resurgence in bricks and mortar stores is also taking place due to a shift toward omnichannel retailing and personalized service delivery. Meanwhile, enhancements based on goods delivery services and retail information and communication technology (ICT) are also needed to deal with societal issues such as labor shortages and an aging population.

The integrated information service developed in response to these circumstances uses the Lumada IoT platform to supply new forms of added value to customers based on the huge amounts of data obtained through the combination of operational technology (OT) and information technology (IT). Hitachi intends to continue engaging in the collaborative creation of high-added-value services with business operators seeking to adopt new ways of “selling” using its integrated information service for digital signage that uses Lumada, with the aim of it growing into an integrated marketing platform that also ties in opportunities for engaging with people as they go about their daily activities through the linking of in-store, community, and in-home information.

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