CASE STUDY
2nd Generation Intel® Core™ i5 Processors
Intel® vPro™ Technology
Transportation Industry

Creating a Better Public Transportation Experience with Digital Signage

Real-time access to service information makes travel easier and more engaging for subway and bus users

Countdown in minutes till next train

Current news items updated twice daily

Scroll with service information

Every day in Barcelona, millions of people take public transportation, riding the subway, buses, cable cars and funiculars. Recently, the city's main public transport operator, Transports Metropolitans de Barcelona* (TMB*), completed an ambitious project that greatly improved the information available to passengers while waiting on platforms and during their journey by bus and metro. For instance, passengers at a subway stop can see the arrival time of the next train, watch news of general interest and read notices related to service delivery, on a high-resolution digital signage display, as shown on the left.

TMB Transports Metropolitans de Barcelona

Telefónica

ADMIRA

"We have successfully integrated different technologies to provide our passengers with a mix of relevant information across multiple modes of transportation."

Carlos Alonso Nuñez
Director of Strategy, Projects and Online Technologies
*Transports Metropolitans de Barcelona**

TMB's information system, called MouTV*, deploys digital signage throughput the city – on subway platforms, in buses and subway cars, in tourist offices – all of which play location-specific content. When designing the system, TMB had several key objectives and satisfied them with a large network of digital signage displays driven by 2nd Generation Intel® Core™ i5 processors with Intel® vPro™ technology.

OBJECTIVES

- **Improve customer service information:** Deliver real-time, location-based information, such as subway/bus arrival times, delays or service stoppage.
- **Add non-travel-related value:** Provide general information: news clips, sports, culture, events and weather.
- **Become a leader in technology/innovation:** Develop a leading-edge information distribution system that reflects most favorably on Barcelona.
- **Enable advertising revenue:** Design the system to allow advertising partners to play advertising (20 second video clips), thereby creating a new revenue source.

SOLUTION

- TMB architected a system capable of sending different types of content to any of its screens - via LAN, WiFi or 3.5G – from a central office.

Customized Screens

MouTV, developed by TMB, is unique in the way customized content is sent to every digital signage display based on its location and screen dimensions. This is important because information needs vary for different travelers, like those waiting for a subway versus others on a bus. Comparing these two scenarios, the display in a subway station (Figure 1) indicates when the next train is arriving, whereas the display in a bus (Figure 2) shows the subsequent stops. TMB's system also adjusts the content resolution and frame size for different screen sizes, such as large screens in subway stations or much smaller screens on buses.

There are other ways the content conveyed to travelers may vary by mode of transportation. For instance, a bus can play a short ad for a business on its route, informing passengers about a special offer or event. Moreover, based on a GPS signal, the digital signage can play the ad when the bus is about to pass by the business. Another difference is the surrounding noise; buses are often on a loud road, so video is subtitled and broadcast without sound, while a subway platform may be quiet enough to allow audio to be heard.

MouTV Architecture

For one and a half years, engineers at TMB defined and deployed the MouTV system, which integrated various content sources and generated customized, multi-zone video streams for different venues in the transportation system. The architecture, depicted in Figure 3, centers around a content management system that is centrally located, which greatly simplifies the support of the entire infrastructure.

Figure 2. Digital Signage Display on a Bus

"Our engineers defined the process for sending information to each digital signage display, comprehending various technologies, content sources and screen layouts, with the aim of increasing our service offered and enhancing the TMB brand."

Carlos Alonso Nuñez
Director of Strategy, Projects and Online Technologies
*Transports Metropolitans de Barcelona**

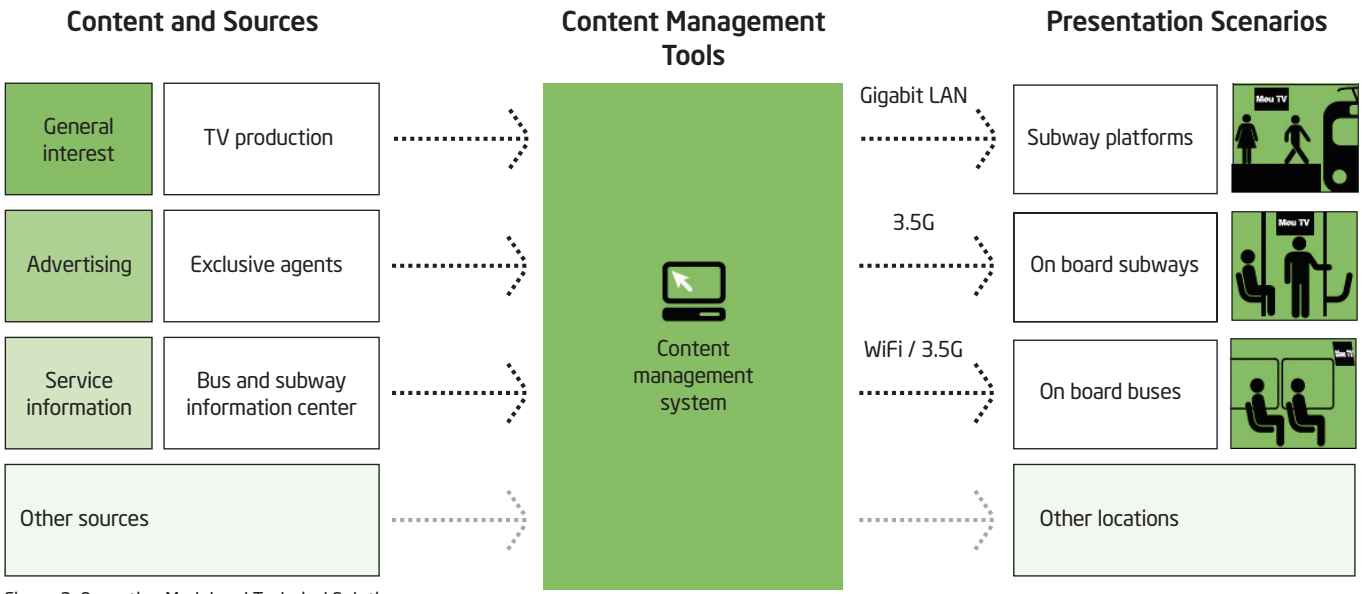

Figure 3. Operating Model and Technical Solution

Figure 4. Digital Signage Display in a Subway Station

Content and Sources:

Service information: This is the mainstay of MouTV programming, and it is played at the same time as general interest and advertising content. Each screen broadcasts three types of service information:

- Real-time information, such as train arrival times, the next bus stop or incidents on specific network lines, based on where the signage is being viewed.
- Text messages about changes to service, scheduled or unscheduled, and corporate information.
- In emergency situations, the channel will interrupt the broadcast to communicate a warning message from the management center.

General interest: The broadcast channel consists of a 15 minute loop of programming, with 50 percent dedicated to items of public interest. Video clips, 10 to 20 seconds long, cover five areas: news, sports, culture, weather and TMB information. The loop repeats continuously and is updated twice a day.

Advertising content: Half the time, the digital signage plays advertising content divided into 20 second clips dispersed within the general interest programming. Specific advertising content can be programmed to play when a bus approaches a point of interest.

Presentation Scenarios

Subway platforms: Since subway platforms are stationary, the content management system sends content over a wired gigabit LAN. The platforms have a combination of high-resolution projectors, 32 and 42 inch TFT (thin-film transistor) screens, and LED widescreen monitors, as shown in Figure 4. The projectors are installed along the sidewalk or between pathways so they are visible to more users.

Inside subway cars: Subway trains are equipped with between 20 and 30 digital signage displays with screens from 15 to 17 inches wide. Trains also have media servers onboard that receive content over 3.5G.

Inside buses: Buses have dual display, 19-inch TFT screens that are driven by a media server, which is also installed on the buses. When buses are parked at night, content is uploaded to them using WiFi. While on the road, buses receive content updates via 3.5G.

Centralized System Management

Managing and distributing content – on a per screen basis – to over a thousand of digital signage displays, some of which are on wheels, is not a trivial task. In fact, this was one of the key challenges of the MouTV project, and TMB solved it by developing a centralized content management system with assistance from Intel and Admira-Telefónica*. From one location, TMB receives, produces and sends the content, as well as manages all the digital signage systems, which greatly reduces support complexity and effort.

An integral part of the content management system is Intel vPro technology with Intel® Active Management Technology (Intel® AMT)[1], which enables TMB personnel to quickly fix many types of system problems remotely, thus getting systems back online faster in order to maintain a high level of passenger service. In addition, the technology allows TMB to manage systems when they are turned off or when the operating system is unresponsive, because it makes use of the manageability capabilities built into Intel® silicon components. For example, Intel AMT enables TMB to:

- *Fix hung systems* - by cycling power, reloading software or booting from a 'gold' hard drive on the network
- *Reduce energy consumption* - by remotely powering off the digital signage when not in use
- *Verify the right content is being displayed* – by using the keyboard-video-mouse (KVM) feature to see what's playing on every system

The technology works over LAN, Wi-Fi and 3G[2] and is supported by the Intel Core i5 processor-based media players supplied by Admira-Telefónica. Communications are encrypted, which helps protect the content from being compromised by hackers.

TMB, a Pioneer in Travel Information

The public transportation network in Barcelona provides an essential service to residents and visitors, with millions of people using the system every day. It's a business that demands efficiency, which can be increased by better communicating travel information to a large number of passengers. TMB expanded on this mission and created a system capable of informing and entertaining travelers with digital signage that spans hundreds of locations and multiple modes of transportation. The system uses leading-edge technology from Intel to play dynamic content and allow LAN, Wi-Fi and 3G-based digital signage screens to be managed remotely from a central location.

"With Intel® vPro™ technology, we can securely control all the media players from a central office using a combination of wired and wireless technologies."

Carlos Alonso Nuñez
Director of Strategy, Projects and Online Technologies
*Transports Metropolitans de Barcelona**

For more information about Intel solutions for digital signage, visit **www.intel.com/go/digitalsignage**

[1] Intel® Active Management Technology (Intel® AMT) requires the platform to have an Intel AMT-enabled chipset, network hardware and software, as well as connection with a power source and a corporate network connection. With regards to notebooks, Intel AMT may not be available or certain capabilities may be limited over a host OS-based VPN or when connecting wirelessly, on battery power, sleeping, hibernating or powered off. For more information, see www.intel.com/p/en_US/embedded/hwsw/technology/amt.

[2] 3G support requires an external 3G modem/router with an Ethernet connection.

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