

SECTION 8.

NEW TECHNOLOGY, NEW APPLICATIONS, NEW CHALLENGES.

This project has been focused on the impact of commercial electronic (digital) roadside signs on traffic flow and safety. Such signs, known as billboards in some jurisdictions and off-premise signs in others, are typically located outside the right-of-way, on private property, and they advertise products that are not sold, or services that are not performed on the property on which the sign is located. Billboards, regardless of the technology used to present and change the display, differ from on-premise signs in that the latter must be, generally, located on the premises at which the advertised service is performed, or product sold.

During the course of our research for this project, we learned of the growing use of new applications that increase the power and/or functionality of these digital, predominantly LED signs. These new applications have begun to appear on billboards in the US and abroad, on mobile (vehicle-mounted) displays, and on on-premise signs. Although some of these applications fall outside the charter of this project, this report would be incomplete without mention of them.

In most cases these new technologies and new applications are not addressed in Federal or local regulations and guidance; in some, regulations have already been imposed to address them. In a third category, some new developments appear to be in direct conflict with existing regulations or guidance. This chapter, although not contemplated when this project was initiated, will provide a brief overview of these new technologies and applications.

Billboard Audio and Other Stimuli.

Digital outdoor advertisements are already in use in some US locations that broadcast audio along with their visual messages. It is not unreasonable to assume that audio, and perhaps other attention-getting stimuli, may appear in the future. Internationally, we are aware that the SANRAL (2000) regulations recognize this potential, and prohibit it. Part B, Subsection 4 states: “No advertisement will be allowed that emits a noise, sound, smoke, smell or odours” (p. 13). In the U.S., both St. Croix County, Wisconsin, and the city of Tucson, Arizona, have similar requirements.

Digital Billboards on Moving Vehicles.

Vehicles in the traffic stream, primarily commercial trucks, have long borne advertisements for the truck owner or for the products being carried. One might think of these as mobile “on-premise” signs. In some cases, “supergraphics” (although, not, to our

knowledge, digital) have been demonstrated that can convert trucks or large, over-the-road trailers into dramatic mobile visual images. One example is shown in Figure 8.



Figure 8. An over-the-road trailer featuring “supergraphic” imagery.

Urban and suburban taxicabs, buses, and rail transit vehicles may also display advertisements, and increasingly, these advertisements feature LED signage. These are the equivalent of mobile “off-premise” ads in that they advertise a product or service that has nothing to do with the vehicle displaying the ad.

For example, as part of its “Prepare Bay Area,” earthquake preparedness campaign, the (San Francisco) Bay Area Chapter of the American Red Cross faced a truck with a two-sided artist’s rendering of what downtown San Francisco might look like after the next earthquake. The truck drove around the city to attract attention, then parked at a location where the billboard lined up perfectly with the existing streetscape, as shown in Figures 9a and 9b.



Figure 9a. A mobile billboard from the (San Francisco) Bay Area Chapter of the American Red Cross parked in front of a building, depicting what might happen to that building after an earthquake.



Figure 9b. The same mobile billboard shown in Figure 8a looking in the opposite direction.

In the past few years, a number of products have become available that take advantage of the latest technologies to incorporate LED billboards onto the sides and rear of commercial trucks. In many cases, the sole purpose of such vehicles is to serve as a rolling advertisement; in others, the truck may display advertising while in transit, then park at a specific location to use its large-screen display in support of a concert, sporting event, parade, or other special function. In the latest advances, these signs can be raised electrically or hydraulically above the roof level of the truck; in some cases they can also rotate 360°. One company, named GoVision, advertises that its vehicles can display full

motion video while in moving traffic. Indeed, news reports indicate that this occurred recently in Boston. On its website (www.govision.com) the company describes two products, a 40 ft trailer with a 9 ft high by 16 ft wide LED screen, and a 48 ft trailer equipped with a 627 sq ft, high definition video (720p resolution) wide LED screen.¹⁷ The smaller vehicle, with its LED screen blank, is shown in Figure 10.

Describing this “moving television” product, the company suggests these uses:

- Get stuck in morning traffic playing a breakfast products commercial
- Drive around a sporting event’s traffic promoting the new high powered SUV
- Add GoBig to your Xmas parade playing the latest holiday movie clips



Figure 10. A 40 ft trailer with an integral LED video screen measuring 9x16 ft. The screen shows full motion video while the truck is moving in traffic, and can be raised to a height of 25 ft for viewing while parked.

In other, less dramatic examples, several urban and suburban commuter bus and rail systems have begun to integrate digital billboards onto the sides of their vehicles. Figure 11 shows an urban transit bus displaying a digital advertisement.

¹⁷ A standard size highway billboard, conventional or digital, measures 672 sq ft.

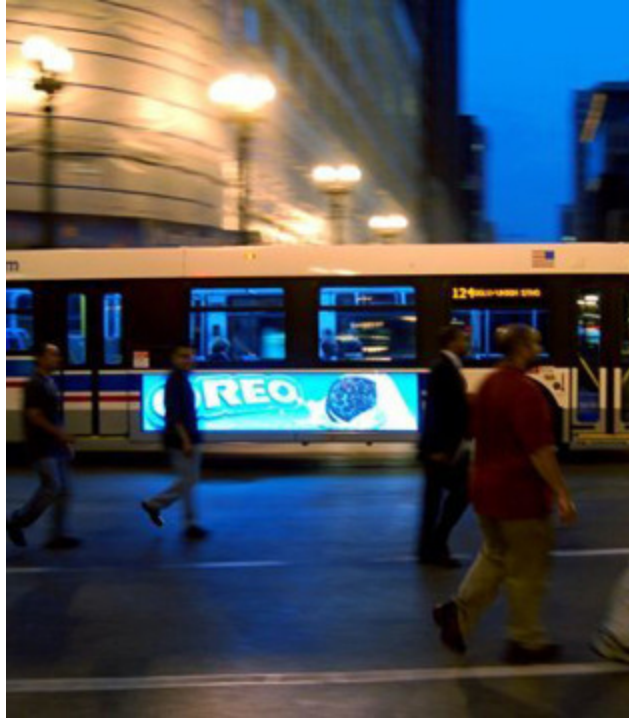


Figure 11. An urban transit bus displaying an LED billboard in traffic.

Although we are unaware of any research that has been conducted to evaluate these mobile display units, it would seem that the potential for driver distraction from the use of this technology within the traffic stream is quite high, not only because the changeable (and video) signs are in physical motion, but also because the presence of the advertising signage at extremely close lateral distances may require an extreme eye and/or head movement for the sign to be seen.¹⁸

As discussed earlier in this report, several jurisdictions have recognized or anticipated the risk of vehicle-based advertising, and have imposed restrictions on its use. In some cases, these controls are also directed at such vehicles when they are in operation while parked adjacent to roads visible to passing drivers within the jurisdiction's control. See, for example, the ordinances of St. Johns County, Florida, and Tucson, Arizona, discussed in Section 5.

¹⁸ It is noted that digital display technology using LEDs is also being marketed to the general public as a mechanism both for "personalizing" a vehicle, or for "marketing," "while providing automobile owners with an opportunity to profit from driving their vehicle." (See, for example, LED Wheels, 2004). Although there is clear potential for driver distraction from such vehicle-mounted digital imagery, it is beyond the scope of this project to determine whether such applications would constitute commercial advertising and thus be subject to the controls in place in certain jurisdictions and which may be considered for adoption in others.

“Personalized” And Interactive Billboards.

Interactive billboards, those that permit, support, or encourage personalized communications with the driver *in real-time*, have begun to appear on US roads, although this technology seems to be more progressing more quickly in Europe. Made possible by newer and ever more sophisticated technologies include cellular phones, text messaging, RFID, infra-red cameras, and others, these DBBs may take several different forms. These are briefly discussed below.

a. Signs that convey a personal greeting to the driver.

The popular Mini Cooper automobile, owned by BMW Corporation, has introduced a series of billboards in major US cities that display a static image of the automobile, along with a one line digital display that is normally blank. However, if the owner of a Mini Cooper has “opted in” by expressing an interest in the program, the sign’s digital display will present a “personal greeting” to the approaching driver. Figure 12 illustrates one of these billboards in use in New York City.



Figure 12. Personalized Mini Cooper billboard.

b. Signs that interact with the driver in real time.

In Paris, a trial has begun in which cell phone users who have agreed to participate will receive phone calls from billboards (Christensen, 2006; Crampton, 2006). These calls will offer additional product information, promotions, etc., that are keyed to the users’ location-enabled cell phones. The enabling technology was originally developed by the French National Institute for Research in Computer Science and Control to provide assistance to disabled people. According to the outdoor advertising

company that is running the project: “With this project, we are really starting to create the personalized digital city... We eventually will see a rich dialogue running between mobile phone and what are now uncommunicative objects.”

In Belgium, as a driver approaches the digital billboard shown in Figure 13 the sign displays a series of codes. The driver chooses one, and sends a text message to an indicated number. The billboard responds by sending a return message containing a question. The driver then texts his answer to the question. The answer, in turn, triggers the DBB to respond like a pinball machine. A correct answer causes the sign to light up, and the driver is entered into a drawing (in this case, for the pictured car); a wrong answer causes the sign to “tilt”



Figure 13. Interactive billboard in Belgium. See text for details of the sign’s operation.

c. Signs that unobtrusively obtain information from drivers and vehicles.

Adjacent to an exit ramp along US 99 in Turlock, California, a “smart” 20 ft by 30 ft high-definition DBB (Figure 14) monitors the passive “local oscillator” signals emitted by the FM radios of passing vehicles. These signals reflect the frequencies to which the radios are tuned. The system compiles the statistical data, merges it with a media audit database that contains detailed consumer demographic and purchasing pattern information coded by radio station format, and enables the sign to post ads targeted to that demographic. “Smart Signs could inform passing motorists about special offers to shoppers as they approach stores or malls. A Smart Sign could entice consumers to respond via text message to a question posed by the sign. Information can even be pulled off the internet and displayed” (Christensen, 2007).



Figure 14. A “smart” DBB in Turlock, California

Many digital billboards have been equipped with video cameras that can record approaching traffic. A recent service aimed at the outdoor advertising industry permits an inconspicuous billboard-mounted camera, supplemented with an infra-red surround lighting device, to record the eye-movements of drivers approaching the sign (Skeen, 2007). Although this service is currently offered as a means to demonstrate to sign owners the amount of driver attention being given to their sign and its specific messages, it is a small technological step to combine these eye movement recordings with other demographic or personal information to target personalized messages or provide other “services.”

DBB Hacking.

One concern about DBBs, unlike any other in this report, is the potential for computer “hackers” to break into the control or communications system for these displays and change the messages and images displayed. For many years, loosely organized groups like the Billboard Liberation Front have made commercial billboards their targets for mischief. The type of technology that wirelessly controls DBBs has proven vulnerable to such vandalism, although reports of such hacking have been disputed.

Related technologies, such as those used for official portable changeable message signs (PCMS) have been successfully hacked in different jurisdictions on several occasions. Just before this report was finalized, the popular news media reported on a series of such hacks at a construction zone in Austin, Texas (Miller, 2009). Figure 15 shows one PCMS that was affected by this activity. At the same time, several websites published detailed instructions on how to perform such hacks (see, for example, Wojdyla, 2009). Although this latest example of vandals hacking into digital signs was quickly fixed by the sign manufacturer, the fact remains that roadside digital control technology is susceptible to being taken over by criminals or pranksters intent on changing the messages and images

displayed on the signs for their own amusement, political or social purposes, or for other reasons. DBB owners and operators should be alert to these challenges, and should design, develop and implement corrective actions. Government agencies responsible for the regulation and oversight of such signs should ensure that any potential vulnerabilities are protected against.



Figure 15. A portable changeable message sign (PCMS) that was “hacked.”