

Letter to the Editor:

At the 2004 IBTTA Spring Technology Workshop, in the current literature and in the press, the trend toward the construction of or conversion to High Occupancy Toll lanes and Open Road Tolling highways is well established. Much of the technology appears to be mature enough to make such roads practical. But the twin functions of violation detection and violation enforcement have not taken full advantage of creative violation dissuasion as it will be possible in the near future.

Everyone agrees that the primary technique for dissuasion of violation is to levy a heavy, punitive fine on a violator, once detected, and schemes abound for a variety of means for charging and collecting such fines, with the expectation that as such fines become known the number of violators will radically shrink. One agreed feature of enforcement techniques is that the cost of enforcement should not burden the roadway. This sounds easier than it really is since, while an effective enforcement system will discourage violators and reduce the total volume of their fines, the initial investment in an effective Violation Processing Center will be expensive. In addition, even if the enforcement system is effective and the fines are heavy, fewer violations will occur as intended, but the VPC will still be staffed at some level with its continuing expenses.

Another universal although rarely enunciated principle of enforcement, even in the most creative approaches, is that there should be no permanent damage to the driver or the vehicle. And also it is widely acknowledged that no fine likely to be authorized in legislation will dissuade some drivers from the challenge of violating.

However, the thinking is constrained by confusion in the definition of a violator. The common unspoken assumption is that the driver of the offending vehicle and the vehicle itself are as one, the violator. In reality, only the driver is culpable but the vehicle is an innocent pawn in the incident. In fact, with the rapid advances in computerization of the vehicle, it can become a valuable participant in the dissuasion process in the near future.

A future violation dissuasion scenario would commence with the detection of the violation. While unambiguous detection of vehicles with only one occupant currently requires human observation, systems now in development, such as encrypted DNA sniffers and shaped-pulse IR imaging, will shortly make this step routine and automatic and compliant with privacy regulations.

Once the violation is detected, the roadway Violation Dissuasion System (VDS) would trigger the vehicle to report the VIN (Vehicle Identification Number) to the VDS via the vehicle's full-time Internet connection. Simultaneously, under the control of the VDS the vehicle radio would turn on and a disturbing announcement would advise the driver that he had been detected and is advised to speak loudly and clearly his name, telephone number and his willingness to pay the toll and the fine. If no acknowledgement is received, shortly the second step in an escalating process of dissuasion would be initiated. The emergency flasher will be activated and the horn will sound (say, two seconds on, two seconds off; the most effective pattern will be found after field trials) and the radio announcement will replay.

After a suitable period without an affirmative response, the VDS will take control of the comfort control subsystem of the vehicle. In August in Phoenix, the air conditioning will be deactivated and the windows closed and locked; in St. Paul in December, the heater will be disabled and the windows lowered.

The next escalation will be to interrupt the ignition to two cylinders of the vehicle to cause maximum motor roughness and discomfort to the driver. (Note that this may not be possible for diesel-engine equipped vehicles.)

Finally, after no response, the turnpike autopilot together with the GPS will take control of the steering of the vehicle and take it to the next highway patrol barracks where it will be brought to a controlled stop in the parking lot. Then, using the tire pressure sensing system in the vehicle, all the tires will be deflated.

This is only an early form of VDS; others more imaginative can no doubt be postulated. While the advantages of such forms of VDS are obvious – minimum capital investment by the roadway, probable 100% effectiveness due to the inconvenience to the driver and the obvious public knowledge of and hilarity at the perpetrator's situation – the various subsystems of the VDS will not evolve spontaneously. The IBTTA should coordinate with the Intelligent Vehicle and the Intelligent Technology communities to agree upon the standards for the needed subsystems. The vehicle manufacturers, perhaps through the American Society of Mechanical Engineers, will rush to cooperate. With such a powerful constituency, the time of well-behaved HOT/ORT roadways cannot be far in the future.

Bob Fielding

Manager, Electronic Toll Collection System Integration
Parsons Brinckerhoff
fielding@pbworld.com