**Electronic toll collection (E-Tolls)** aims to eliminate the delay on [toll roads](http://en.wikipedia.org/wiki/Toll_road) by collecting [tolls](http://en.wikipedia.org/wiki/Toll_%28road_usage%29) electronically. ETC determines whether the cars passing are enrolled in the program, alerts enforcers for those that are not, and electronically debits the accounts of registered car owners without requiring them to stop.

In 1959, Nobel Economics Prize winner [William Vickrey](http://en.wikipedia.org/wiki/William_Vickrey) was the first to propose a system of electronic tolling for the [Washington Metropolitan Area](http://en.wikipedia.org/wiki/Washington_Metropolitan_Area). He proposed that each car would be equipped with a transponder. “The transponder’s personalised signal would be picked up when the car passed through an intersection, and then relayed to a central computer which would calculate the charge according to the intersection and the time of day and add it to the car’s bill”[[1]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-1) Electronic toll collection has facilitated the concession to the private sector of the construction and operation of urban freeways, as well as made feasible the improvement and the practical implementation of [road congestion pricing](http://en.wikipedia.org/wiki/Road_congestion_pricing) schemes in a limited number of urban areas to restrict auto travel in the most congested areas.

In the 1960s and 1970s, free flow tolling was tested with fixed transponders at the undersides of the vehicles and readers, which were located under the surface of the highway.[[2]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-2)

[Norway](http://en.wikipedia.org/wiki/Norway) has been the world's pioneer in the widespread implementation of this technology. ETC was first introduced in [Bergen](http://en.wikipedia.org/wiki/Bergen), in 1986, operating together with traditional tollbooths. In 1991, [Trondheim](http://en.wikipedia.org/wiki/Trondheim) introduced the world's first use of completely unaided full-speed electronic tolling. Norway now has 25 toll roads operating with electronic fee collection (EFC), as the Norwegian technology is called (see [AutoPASS](http://en.wikipedia.org/wiki/AutoPASS)). In 1995, [Portugal](http://en.wikipedia.org/wiki/Portugal) became the first country to apply a single, universal system to all tolls in the country, the [Via Verde](http://en.wikipedia.org/wiki/Via_Verde), which can also be used in parking lots and gas stations. The United States is another country with widespread use of ETC in several states, though many U.S. toll roads maintain the option of manual collection.

[Open road tolling](http://en.wikipedia.org/wiki/Open_road_tolling) (ORT) is a type of electronic toll collection without the use of toll booths. The major advantage to ORT is that users are able to drive through the toll plaza at highway speeds without having to slow down to pay the toll.

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**Overview**

[](http://en.wikipedia.org/wiki/File:FasTrak_transponder.jpg)

[http://bits.wikimedia.org/static-1.23wmf17/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:FasTrak_transponder.jpg)

Many ETC systems use transponders like this one to electronically debit the accounts of registered cars without their stopping

[](http://en.wikipedia.org/wiki/File:Chile_Costanera_Norte_Vehicle_TAG.jpg)

[http://bits.wikimedia.org/static-1.23wmf17/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Chile_Costanera_Norte_Vehicle_TAG.jpg)

Transponder used in some Chilean expressways



[http://bits.wikimedia.org/static-1.23wmf17/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Telepass-A9-20060209.ogg)

Film showing the approach to and passing of a toll station in Italy, using a Telepass OBU. Note the yellow Telepass lane signs and road markings and the sound emitted by the OBU when passing the lane

In some urban settings, automated gates are in use in electronic-toll lanes, with 5 mph (8 km/h) legal limits on speed (and 2 to 3 times that as practical limits even with practice and extreme concentration)[[*clarification needed*](http://en.wikipedia.org/wiki/Wikipedia:Please_clarify)]; in other settings, 20 mph (35 km/h) legal limits are not uncommon. However, in other areas such as the [Garden State Parkway](http://en.wikipedia.org/wiki/Garden_State_Parkway) in New Jersey, and at various locations in California, Florida, Pennsylvania, Delaware, and Texas, cars can travel through electronic lanes at full speed. Illinois' Open Road Tolling program features 274 contiguous miles of barrier-free roadways, where I-PASS or [E-ZPass](http://en.wikipedia.org/wiki/E-ZPass) users continue to travel at highway speeds through toll plazas, while cash payers pull off the main roadway to pay at tollbooths. Currently over 80% of Illinois' 1.4 million daily drivers use an I-PASS.[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)]

Enforcement is accomplished by a combination of a camera which takes a picture of the car and a radio frequency keyed computer which searches for a drivers window/bumper mounted transponder to verify and collect payment. The system sends a notice and fine to cars that pass through without having an active account or paying a toll.

Factors hindering full-speed electronic collection include significant non-participation, entailing lines in manual lanes and disorderly traffic patterns as the electronic- and manual- collection cars "sort themselves out" into their respective lanes; problems with pursuing toll evaders; need, in at least some current (barrier) systems, to confine vehicles in lanes, while interacting with the collection devices, and the dangers of high-speed collisions with the confinement structures; vehicle hazards to toll employees present in some electronic-collection areas; the fact that in some areas at some times, long lines form even to pass through the electronic-collection lanes; and costs and other issues raised when retrofitting existing toll collection facilities. Unionized toll collectors can also be problematic.[[3]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-SlowLane-3)

Even if line lengths are the same in electronic lanes as in manual ones, electronic tolls save registered cars time: eliminating the stop at a window or toll machine, between successive cars passing the collection machine, means a fixed-length stretch of their journey past it is traveled at a higher average speed, and in a lower time. This is at least a psychological improvement, even if the length of the lines in automated lanes is sufficient to make the no-stop-to-pay savings insignificant compared to time still lost due waiting in line to pass the toll gate. Toll plazas are typically wider than the rest of the highway; reducing the need for them makes it possible to fit toll roads into tight corridors.[[3]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-SlowLane-3)

Despite these limitations, however, it is important to recognize that throughput increases if delay at the toll gate is reduced (*i.e.*, if the tollbooth can serve more vehicles per hour). The greater the throughput of any toll lane, the fewer lanes required, so expensive construction can be deferred. Specifically, the toll-collecting authorities have incentives to resist pressure to limit the fraction of electronic lanes in order to limit the length of manual-lane lines. In the short term, the greater the fraction of automated lanes, the lower the cost of operation (once the capital costs of automating are amortized). In the long term, the greater the relative advantage that registering and turning one's vehicle into an electronic-toll one provides, the faster cars will be converted from manual-toll use to electronic-toll use, and therefore the fewer manual-toll cars will drag down average speed and thus capacity.

In some countries, some toll agencies that use similar technology have set up (or are setting up) reciprocity arrangements, which permit one to drive a vehicle on another operator's tolled road with the tolls incurred charged to the driver's toll-payment account with their home operator. An example is the United States E-ZPass tag, which is accepted on toll roads, bridges and tunnels in fourteen states from [Illinois](http://en.wikipedia.org/wiki/Illinois) to [Maine](http://en.wikipedia.org/wiki/Maine).

[](http://en.wikipedia.org/wiki/File:SevernTAG.JPG)

[http://bits.wikimedia.org/static-1.23wmf17/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:SevernTAG.JPG)

[e-TAG](http://en.wikipedia.org/wiki/E-TAG) lane on the [Second Severn Crossing](http://en.wikipedia.org/wiki/Second_Severn_Crossing), [Wales](http://en.wikipedia.org/wiki/Wales)

In Australia, there are a number or organisations that provide tags that can be used on toll roads. They include [Roads and Maritime Services](http://en.wikipedia.org/wiki/Roads_and_Maritime_Services), Roam and [E-Toll](http://en.wikipedia.org/w/index.php?title=E-Toll&action=edit&redlink=1). A toll is debited to the customer's account with their tag provider. Some toll road operators – including Sydney's [Sydney Harbour Tunnel](http://en.wikipedia.org/wiki/Sydney_Harbour_Tunnel), [Lane Cove Tunnel](http://en.wikipedia.org/wiki/Lane_Cove_Tunnel), and [Westlink M7](http://en.wikipedia.org/wiki/Westlink_M7), Melbourne's [CityLink](http://en.wikipedia.org/wiki/CityLink) and [Eastlink](http://en.wikipedia.org/wiki/EastLink_%28Melbourne%29), and Brisbane's [Gateway Motorway](http://en.wikipedia.org/wiki/Gateway_Motorway) – encourage use of such tags, and apply an additional vehicle matching fee to vehicles without a tag.

A similar device in France, called Liber-T for light vehicles and TIS-PL for HGVs, is accepted on all toll roads in the country.

In Brazil, the [Sem Parar/Via-Fácil](http://www.viafacil.com.br) system allows customers to pass through tolls in more than 1,000 lanes in the states of São Paulo, Paraná, Rio Grande do Sul, Santa Catarina, Bahia and Rio de Janeiro. Sem Parar/Via-Fácil also allows users to enter and exit more than 100 parking lots. There are also other systems, such as [via expressa](http://www.viaexpressa.net/oquee.php), [onda livre](http://www.pedagioondalivre.com.br) and [auto expresso](https://www.autoexpresso.com.br), that are present in the states of Rio de Janeiro, Rio Grande do Sul, Santa Catarina, Parana and Minas Gerais.

In Pakistan, the National Database and Registration Authority is implementing an electronic toll collection system on motorways using RFID.[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)]

The European Union has created the EFC-directive,[[4]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-4) which attempts to standardize European toll collection systems. Systems deployed after 1 January 2007 must support at least one of the following technologies: satellite positioning, mobile communications using the GSM-GPRS standard or 5.8 GHz microwave technology. All toll roads in [Ireland](http://en.wikipedia.org/wiki/Republic_of_Ireland) must support the [eToll](http://en.wikipedia.org/wiki/EToll) tag standard.

**Use in urban areas and for congestion pricing**

See also: [Road pricing](http://en.wikipedia.org/wiki/Road_pricing) and [Congestion pricing](http://en.wikipedia.org/wiki/Congestion_pricing)

[](http://en.wikipedia.org/wiki/File:Chile_Costanera_Norte_crossing_downtown_Santiago.JPG)

[http://bits.wikimedia.org/static-1.23wmf17/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Chile_Costanera_Norte_crossing_downtown_Santiago.JPG)

ETC at "Costanera Norte" Freeway, crossing downtown 100% free flow, [Santiago, Chile](http://en.wikipedia.org/wiki/Santiago,_Chile)

[](http://en.wikipedia.org/wiki/File:ERPBugis.JPG)

[http://bits.wikimedia.org/static-1.23wmf17/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:ERPBugis.JPG)

[Electronic Road Pricing](http://en.wikipedia.org/wiki/Electronic_Road_Pricing) Gantry at North Bridge Road, [Singapore](http://en.wikipedia.org/wiki/Singapore)

The most revolutionary application of ETC is in the urban context of congested cities, allowing to charge tolls without vehicles having to slow down. This application made feasible to concession to the private sector the construction and operation of urban freeways, as well as the introduction or improvement of [congestion pricing](http://en.wikipedia.org/wiki/Congestion_pricing),[[5]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-5) as a policy to restrict auto travel in downtown areas.

Between 2004 and 2005, [Santiago, Chile](http://en.wikipedia.org/wiki/Santiago_de_Chile) implemented the world's first 100% full speed electronic tolling with transponders crossing through the city's core (CBD) in a system of several concessioned urban freeways ([Autopista Central and Autopista](http://www.cnorte.cl) [Costanera Norte](http://en.wikipedia.org/wiki/Costanera_Norte)). The [United Arab Emirates](http://en.wikipedia.org/wiki/United_Arab_Emirates) implemented in 2007 a similar road toll collection in [Dubai](http://en.wikipedia.org/wiki/Dubai), called [Salik](http://en.wikipedia.org/wiki/Salik_%28Road_Toll%29).[[6]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-6) Similar schemes were previously implemented but only on bypass or outer ring urban freeways in several cities around the world: [Toronto](http://en.wikipedia.org/wiki/Toronto) in 1997 ([Highway 407](http://en.wikipedia.org/wiki/Ontario_Highway_407)), several roads in [Norway](http://en.wikipedia.org/wiki/Norway) ([AutoPASS](http://www.autopass.no/om_autopass/english.stm)), [Melbourne](http://en.wikipedia.org/wiki/Melbourne) in 2000 ([CityLink](http://en.wikipedia.org/wiki/CityLink)), and [Tel Aviv](http://en.wikipedia.org/wiki/Tel_Aviv) also in 2000 ([Highway 6](http://en.wikipedia.org/wiki/Highway_6_%28Israel%29)).

Congestion pricing or urban toll schemes were implemented to enter the downtown area using ETC technology and/or cameras and video recognition technology to get the plate numbers in several cities around the world: urban tolling in Norway's three major cities:[[7]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-7) [Bergen](http://en.wikipedia.org/wiki/Bergen) (1986), [Oslo](http://en.wikipedia.org/wiki/Oslo) (1990), and [Trondheim](http://en.wikipedia.org/wiki/Trondheim) (1991) (see [Trondheim Toll Scheme](http://en.wikipedia.org/wiki/Trondheim_Toll_Scheme)); [Singapore](http://en.wikipedia.org/wiki/Singapore) in 1998 (see [Singapore’s Electronic Road Pricing](http://en.wikipedia.org/wiki/Electronic_Road_Pricing)), as an upgrade to the world's first successful [congestion pricing](http://en.wikipedia.org/wiki/Congestion_pricing) scheme implemented with manual control in 1975[[8]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-8) (see also [Singapore's Area Licensing Scheme](http://en.wikipedia.org/wiki/Area_Licensing_Scheme)); [Rome](http://en.wikipedia.org/wiki/Rome#Motor_Traffic_Limited_Zone_.28ZTL.29) in 2001 as an upgrade to the manual zone control system implemented in 1998;[[9]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-9)[[10]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-10) [London](http://en.wikipedia.org/wiki/London) in 2003 and extended in 2007 (see [London congestion charge](http://en.wikipedia.org/wiki/London_congestion_charge)); [Stockholm](http://en.wikipedia.org/wiki/Stockholm), tested in 2006 and made the charge permanent in 2007 (see [Stockholm congestion tax](http://en.wikipedia.org/wiki/Stockholm_congestion_tax)); and in [Valletta](http://en.wikipedia.org/wiki/Valletta), the capital city of [Malta](http://en.wikipedia.org/wiki/Malta), since May 2007.[[11]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-11)[[12]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-12)

In January 2008, [Milan](http://en.wikipedia.org/wiki/Milan) began a one-year trial program called [Ecopass](http://en.wikipedia.org/wiki/Ecopass), a pollution pricing program in which low-emission-standard vehicles pay a user fee; [alternative fuel vehicles](http://en.wikipedia.org/wiki/Alternative_fuel_vehicle) and vehicles using conventional fuels but compliant with the [Euro IV](http://en.wikipedia.org/wiki/Euro_IV) emission standard are exempted.[[13]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-13)[[14]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-14)[[15]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-15)[[16]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-16) The program was extended through December 2011 and in January 2012 was replaced by a congestion pricing scheme called [Area C](http://en.wikipedia.org/wiki/Milan_Area_C).[[17]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-17)[[18]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-18)

[New York City](http://en.wikipedia.org/wiki/New_York_City) considered the implementation of a [congestion pricing](http://en.wikipedia.org/wiki/Congestion_pricing) scheme.[[19]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-19)[[20]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-20)[[21]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-21) The proposal was approved by the [New York City Council](http://en.wikipedia.org/wiki/New_York_City_Council) on March 31, 2008,[[22]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-22) however, on April 7, 2008 the [New York State Assembly](http://en.wikipedia.org/wiki/New_York_State_Assembly) decided not to vote on the proposal, which means that the plan is stalled.[[23]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-23)[[24]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-24) (see [New York congestion pricing](http://en.wikipedia.org/wiki/New_York_congestion_pricing))

In 2006, [San Francisco](http://en.wikipedia.org/wiki/San_Francisco) transport authorities began a comprehensive study to evaluate the feasibility of introducing congestion pricing. The charge would be combined with other traffic reduction implementations, allowing money to be raised for public transit improvements and bike and pedestrian enhancements.[[25]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-25) The various pricing scenarios considered were presented in public meetings in December 2008, with final study results expected in 2009.[[26]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-NYTimes01_09-26) (see [San Francisco congestion pricing](http://en.wikipedia.org/wiki/San_Francisco_congestion_pricing))

**Technologies**

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Electronic toll collection systems rely on four major components: automated vehicle identification, automated vehicle classification, transaction processing, and violation enforcement.

The four components are somewhat independent, and, in fact, some toll agencies have contracted out functions separately. In some cases, this division of functions has resulted in difficulties. In one notable example, the [New Jersey](http://en.wikipedia.org/wiki/New_Jersey) [E-ZPass](http://en.wikipedia.org/wiki/E-ZPass) regional consortium's Violation Enforcement contractor did not have access to the Transaction Processing contractor's database of customers. This, together with installation problems in the automated vehicle identification system, led to many customers receiving erroneous violation notices, and a violation system whose net income, after expenses, was negative, as well as customer dissatisfaction.

**Automated vehicle identification**

[](http://en.wikipedia.org/wiki/File:Electronic_Toll_Equipment_in_Ontario.jpg)

[http://bits.wikimedia.org/static-1.23wmf17/skins/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Electronic_Toll_Equipment_in_Ontario.jpg)

Some highways, such as [Ontario's](http://en.wikipedia.org/wiki/Ontario) [Highway 407](http://en.wikipedia.org/wiki/Ontario_Highway_407) use [automatic number plate recognition](http://en.wikipedia.org/wiki/Automatic_number_plate_recognition)

Automated vehicle identification (AVI) is the process of determining the identity of a vehicle subject to tolls. The majority of toll facilities record the passage of vehicles through a limited number of toll gates. At such facilities, the task is then to identify the vehicle in the gate area.

Some early AVI systems used [barcodes](http://en.wikipedia.org/wiki/Barcode) affixed to each vehicle, to be read optically at the toll booth. Optical systems proved to have poor reading reliability, especially when faced with inclement weather and dirty vehicles.

Most current AVI systems rely on [radio-frequency identification](http://en.wikipedia.org/wiki/Radio-frequency_identification), where an antenna at the toll gate communicates with a [transponder](http://en.wikipedia.org/wiki/Transponder) on the vehicle via [Dedicated Short Range Communications (DSRC)](http://en.wikipedia.org/wiki/Dedicated_Short_Range_Communications). RFID tags have proved to have excellent accuracy, and can be read at highway speeds. The major disadvantage is the cost of equipping each vehicle with a transponder, which can be a major start-up expense, if paid by the toll agency, or a strong customer deterrent, if paid by the customer.

To avoid the need for transponders, some systems, notably the 407 ETR (Electronic Toll Route) near [Toronto](http://en.wikipedia.org/wiki/Toronto), use automatic number plate recognition. Here, a system of cameras captures images of vehicles passing through tolled areas, and the image of the number plate is extracted and used to identify the vehicle. This allows customers to use the facility without any advance interaction with the toll agency. The disadvantage is that fully automatic recognition has a significant error rate, leading to billing errors and the cost of transaction processing (which requires locating and corresponding with the customer) can be significant. Systems that incorporate a manual review stage have much lower error rates, but require a continuing staffing expense.

A few toll facilities cover a very wide area, making fixed toll gates impractical. The most notable of these is a truck tolling system in [Germany](http://en.wikipedia.org/wiki/Germany). This system instead uses [Global Positioning System](http://en.wikipedia.org/wiki/Global_Positioning_System) location information to identify when a vehicle is located on a tolled [Autobahn](http://en.wikipedia.org/wiki/Autobahn). Implementation of this system turned out to be far lengthier and more costly than expected.

As smart phone use becomes more commonplace, some toll road management companies have turned to mobile phone apps to inexpensively automate and expedite paying tolls from the lanes. One such example application is Alabama Freedom Pass mobile, used to link customer accounts at sites operated by American Roads LLC. The app communicates in real time with the facility [transaction processing system](http://en.wikipedia.org/wiki/Transaction_processing_system) to identify and debit customer accounts or bill a major credit card.

**Automated vehicle classification**

Automated vehicle classification is closely related to automated vehicle identification (AVI). Most toll facilities charge different rates for different types of vehicles, making it necessary to distinguish the vehicles passing through the toll facility.

The simplest method is to store the vehicle class in the customer record, and use the AVI data to look up the vehicle class. This is low-cost, but limits user flexibility, in such cases as the automobile owner who occasionally tows a trailer.

More complex systems use a variety of sensors. Inductive sensors embedded in the road surface can determine the gaps between vehicles, to provide basic information on the presence of a vehicle. Treadles permit counting the number of axles as a vehicle passes over them and, with offset-treadle installations, also detect dual-tire vehicles. Light-curtain [laser](http://en.wikipedia.org/wiki/Laser) profilers record the shape of the vehicle, which can help distinguish trucks and trailers.

**Transaction processing**

Transaction processing deals with maintaining customer accounts, posting toll transactions and customer payments to the accounts, and handling customer inquiries. The transaction processing component of some systems is referred to as a "customer service center". In many respects, the transaction processing function resembles [banking](http://en.wikipedia.org/wiki/Bank), and several toll agencies have contracted out transaction processing to a bank.

Customer accounts may be postpaid, where toll transactions are periodically billed to the customer, or prepaid, where the customer funds a balance in the account which is then depleted as toll transactions occur. The prepaid system is more common, as the small amounts of most tolls makes pursuit of uncollected debts uneconomic. Most postpaid accounts deal with this issue by requiring a [security deposit](http://en.wikipedia.org/wiki/Security_%28finance%29), effectively rendering the account a prepaid one.

**Violation enforcement**

A violation enforcement system (VES) is useful in reducing unpaid tolls, as an unmanned toll gate otherwise represents a tempting target for toll evasion. Several methods can be used to deter toll violators.

Police patrols at toll gates can be highly effective. In addition, in most jurisdictions, the legal framework is already in place for punishing toll evasion as a traffic infraction. However, the expense of police patrols makes their use on a continuous basis impractical, such that the probability of being stopped is likely to be low enough as to be an insufficient deterrent[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)].

A physical barrier, such as a gate arm, ensures that all vehicles passing through the toll booth have paid a toll. Violators are identified immediately, as the barrier will not permit the violator to proceed. However, barriers also force authorized customers, which are the vast majority of vehicles passing through, to slow to a near-stop at the toll gate, negating much of the speed and capacity benefits of electronic tolling.

[Automatic number plate recognition](http://en.wikipedia.org/wiki/Automatic_number_plate_recognition), while rarely used as the primary vehicle identification method, is more commonly used in violation enforcement. In the VES context, the number of images collected is much smaller than in the AVI context. This makes manual review, with its greater accuracy over fully automated methods, practical. However, many jurisdictions require legislative action to permit this type of enforcement, as the number plate identifies only the vehicle, not its operator, and many traffic enforcement regulations require identifying the operator in order to issue an infraction.

An example of this is the vToll system on the Illinois Tollway,[[27]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-27) which requires transponder users to enter their license plate information before using the system. If the transponder fails to read, the license plate number is matched to the transponder account, and the regular toll amount is deducted from the account rather than a violation being generated.[[28]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-28) If the license plate can't be found in the database, then it is processed as a violation. An interesting aspect of Illinois' toll violation system is a 7 day grace period, allowing tollway users to pay missed tolls online with no penalty the 7 days following the missed toll.[[29]](http://en.wikipedia.org/wiki/Electronic_toll_collection#cite_note-29)