Claims

1. A method for paying a fee for the use of a road network subject to a toll by a vehicle (1),
- wherein a random generator (2) generates a random character string (S) and transmits it to an electronic payment system (3) to transact the fee payment as well as to a monitoring device (4) for the road-side checking of a usage authorization of vehicles (1) using the road network,
- wherein, in order to acquire a usage authorization, a user logs on to the payment system (3) and, in doing so, enters a registration number (K) of the vehicle (1) intended for the use,
- wherein the payment system (3) generates a hash value (H) from the registration number (K) and the currently valid character string (S) by means of a hash algorithm,
- wherein the payment system (3) transfers the generated hash value (H) to an electronic operator system (5) of a toll operator, which keeps the transferred hash value (H) available for monitoring purposes,
- wherein, by means of video recording and evaluation of a passing vehicle (1), the monitoring device (4) detects a registration number (K) of the vehicle (1), also generates the hash value (H) from the detected registration number (K) and the currently valid character string (S) by means of the hash algorithm and transfers the generated hash value (H) to the operator system (5),
- wherein the operator system (5) checks whether the hash value (H) transferred from the monitoring device (4) matches one of the hash values (H) that have been transferred from the payment system (3) and are still kept available,
- wherein, in order to acquire a time-dependent usage authorization, a user logs on to the payment system (3) and,

in doing so, enters a registration number (K) of the vehicle (1) intended for the use as well as a usage period (T),
– wherein the payment system (2) transacts the fee payment due for the usage period (T), generates the hash value (H) if the fee payment is successful and transfers it to the operator system (5) with the desired usage period (T),
– wherein the operator system (5) keeps the transferred hash value (H) available for monitoring purposes until the usage period (T) has elapsed.

2. The method as claimed in claim 1,
– wherein the monitoring device (4) generates an evidence dataset (D) of a vehicle passage, and
– wherein the monitoring device (4) transmits the generated evidence dataset (D) to the operator system (5) when the result of the check in the operator system (5) is that the hash value (H) transferred by the monitoring device (4) does not match any of the hash values (H) that are still being kept available, and otherwise deletes the evidence dataset (D).

3. The method as claimed in claim 2,
– wherein the evidence dataset (D) has a video image and the registration number (K) of the passing vehicle (1) as well as a monitoring time point (t).

4. The method as claimed in claim 2 or 3,
– wherein the monitoring device (4) deletes the evidence dataset (D) once a predefinable period of time has elapsed, if the operator system (5) has not requested an evidence dataset (D) within the period of time.

5. The method as claimed in one of claims 1 to 4,

– wherein the payment system (3) automatically transmits an electronic invoice (R) for the fee payment to the user.

6. A method for paying a fee for the use of a road network subject to a toll by a vehicle (1),
– wherein a random generator (2) generates a random character string (S) and transmits it to an electronic payment system (3) to transact the fee payment as well as to a monitoring device (4) for the road-side checking of a usage authorization of vehicles (1) using the road network,
– wherein, in order to acquire a usage authorization, a user logs on to the payment system (3) and, in doing so, enters a registration number (K) of the vehicle (1) intended for the use,
– wherein the payment system (3) generates a hash value (H) from the registration number (K) and the currently valid character string (S) by means of a hash algorithm,
– wherein the payment system (3) transfers the generated hash value (H) to an electronic operator system (5) of a toll operator, which keeps the transferred hash value (H) available for monitoring purposes,
– wherein, by means of video recording and evaluation of a passing vehicle (1), the monitoring device (4) detects a registration number (K) of the vehicle (1), also generates the hash value (H) from the detected registration number (K) and the currently valid character string (S) by means of the hash algorithm and transfers the generated hash value (H) to the operator system (5),
– wherein the operator system (5) checks whether the hash value (H) transferred from the monitoring device (4) matches one of the hash values (H) that have been transferred from the payment system (3) and are still kept available,

– wherein, in order to acquire a route-dependent usage authorization, a user logs on to the payment system (3) via a mobile terminal (6) that is also carried in the vehicle (1) being used, and in the process enters the registration number (K) of the vehicle (1),
– wherein the payment system (3) transfers the generated hash value (H) to the operator system (5) and to the terminal (6),
– wherein the operator system (5) keeps the transferred hash value (H) available until the user logs out of the payment system (3) via the terminal (6) when exiting the road network subject to a toll,
– wherein the terminal (6) determines its geographical position (Pn) on an ongoing basis and transmits its currently determined position (Pn) in each case with determination time point (Tn) and hash value (H) to the operator system (5) at predefinable time intervals,
– wherein for a hash value (H), a route length (L) of a route covered by the assigned vehicle (1) is determined from the transmitted positions (Pn) in the operator system (5).

7. The method as claimed in claim 6,
– wherein the monitoring device (4) generates an evidence dataset (D) of a vehicle passage, and
– wherein the monitoring device (4) transmits the generated evidence dataset (D) to the operator system (5) when the result of the check in the operator system (5) is that the hash value (H) transferred by the monitoring device (4) does not match any of the hash values (H) that are still being kept available, and otherwise deletes the evidence dataset (D).

8. The method as claimed in claim 7,

– wherein the evidence dataset (D) has a video image and the registration number (K) of the passing vehicle (1) as well as a monitoring time point (t).

9. The method as claimed in claim 7 or 8,
– wherein the monitoring device (4) deletes the evidence dataset (D) once a predefinable period of time has elapsed, if the operator system (5) has not requested an evidence dataset (D) within the period of time.

10. The method as claimed in one of claims 6 to 9,
– wherein the payment system (3) automatically transmits an electronic invoice (R) for the fee payment to the user.

11. The method as claimed in claim 6,
– wherein for a hash value (H), the operator system (5) performs a plausibility check for the location and/or travel path and/or speed of the vehicle (1) assigned to the hash value (H) on the basis of the transmitted positions (Pn) and determination time points (Tn).

12. The method as claimed in claim 6 or 11,
– wherein once the user has logged out, the payment system (3) requests the route length (L) covered by the vehicle (1) between entry and exit and transacts the fee payment due for the route length (L) from the operator system (5).

13. The method as claimed in claim 12,
– wherein the electronic invoice (R) always, or following activation by the user, features the travel path covered and/or the route length (L) thereof, for which the fee is charged.

14. A toll system (10) for paying a fee for the use of a road network subject to a toll by a vehicle (1), which is embodied for performing a method as claimed in one of claims 1 to 13.