CLAIMS

What is claimed is:

1. An open road tolling method, applied to a tolling system, wherein the method comprises:

obtaining vehicle information of a driving vehicle on a toll road, wherein the vehicle information has a corresponding user account on a payment platform;

publishing a vehicle travel history to a blockchain network by using a first blockchain node corresponding to the tolling system in the blockchain network, wherein the vehicle travel history comprises a travelled distance of the driving vehicle on the toll road; ~~and~~

in response to determining that the travelled distance reaches a predetermined distance, determining, by an anchor node of the blockchain network associated with the tolling system, a toll fee corresponding to the predetermined distance;

determining, by the anchor node, a first blockchain asset equivalent in value to the toll fee is less than or equal to a second blockchain asset of a user account associated with the driving vehicle and on the payment platform; and

performing, by the anchor node, an asset transfer operation between an offchain asset in the user account and the first blockchain asset in a blockchain account of the tolling system. ~~related to the payment platform based on the vehicle travel history each time the travelled distance of the driving vehicle on the toll road reaches a predetermined distance, so as to charge an asset corresponding to the predetermined distance.~~

2. The method according to claim 1, wherein ~~the~~ obtaining vehicle information of ~~a~~the driving vehicle on ~~a~~the toll road comprises:

performing an information acquisition operation on ~~a~~the driving vehicle on a corresponding section of the toll road by using a first Internet of Things device associated with the tolling system; and

determining the vehicle information of the driving vehicle based on information obtained by the first Internet of Things device.

3. The method according to claim 2, wherein several first Internet of Things devices are separately installed at corresponding locations on the toll road, and a spacing between adjacent first Internet of Things devices is not greater than the

predetermined distance; and the method further comprises:

determining that the travelled distance of the driving vehicle reaches the predetermined distance when multiple first Internet of Things devices successively obtain the vehicle information of the driving vehicle and a total spacing ~~between~~ encompassed by an entirety of the multiple first Internet of Things devices is the predetermined distance.

4. The method according to claim 2, wherein the first Internet of Things device comprises at least one of the following: a monitoring device, an RFID reader, a Bluetooth device, an optical sensor, and a signal receiver.

5. The method according to claim 2, wherein ~~the~~ performing ~~an~~ the information acquisition operation on ~~a~~the driving vehicle on a corresponding section of the toll road by using ~~a~~the first Internet of Things device associated with the tolling system comprises:

when it is determined that there is ~~a~~ the driving vehicle on the corresponding ~~toll road~~ section of the toll road by using the first Internet of Things device, further performing an information acquisition operation on the driving vehicle by using the first Internet of Things device; or

when it is determined that there is ~~a~~ the driving vehicle on the corresponding toll road section by using a second Internet of Things device associated with the tolling system, further performing an information acquisition operation on the driving vehicle by using the first Internet of Things device.

6. The method according to claim 1, wherein ~~the~~ performing ~~an~~the asset transfer operation ~~related to the payment platform based on the vehicle travel history each time the travelled distance of the driving vehicle on the toll road reaches a predetermined distance~~ comprises:

each time the travelled distance reaches the predetermined distance, initiating an asset charging request for the vehicle information to the payment platform, wherein the asset charging request comprises an identifier of the vehicle travel history; and

charging an asset transferred by the payment platform from the user account; or when a limit of credit of the user account is not exceeded, charging a credit asset related to the user account and transferred by the payment platform.

7. The method according to claim 1, wherein ~~the~~ performing ~~an~~the asset transfer operation ~~related to the payment platform based on the vehicle travel history each~~

~~time the travelled distance of the driving vehicle on the toll road reaches a predetermined distance~~ comprises:

each time the travelled distance reaches the predetermined distance, initiating a contract operation used for asset transfer by using the first blockchain node, wherein a validation condition of the contract operation comprises that the travelled distance reaches the predetermined distance~~; and~~

~~after the contract operation takes effect, receiving, by using the first blockchain node, a blockchain asset corresponding to the predetermined distance and transferred by a second blockchain node corresponding to the payment platform in the blockchain network~~, wherein ~~an~~the offchain asset is equivalent to the first blockchain asset ~~is deducted from the user account by the payment platform~~.

8. The method according to claim 1, wherein ~~the~~ performing ~~an~~the asset transfer operation ~~related to the payment platform based on the vehicle travel history each time the travelled distance of the driving vehicle on the toll road reaches a predetermined distance~~ comprises:

~~performing an asset transfer operation related to the payment platform based on the vehicle travel history each time the travelled distance of the driving vehicle on the toll road reaches the predetermined distance; and~~

after the asset transfer corresponding to the predetermined distance is ~~charged~~ completed, resetting the travelled distance to recalculate the travelled distance.

9. The method according to claim 1, further comprising:

when ~~any~~a vehicle drives to an entrance of the toll road, initiating a query request to the payment platform based on vehicle information of the ~~any~~ vehicle; and

when it is determined that a user account corresponding to the vehicle information of the ~~any~~ vehicle exists on the payment platform, allowing the ~~any~~ vehicle to pass, so that the ~~any~~ vehicle enters the toll road, ~~;~~ otherwise, refusing the ~~any~~ vehicle to pass.

10. An open road tolling method, applied to a tolling system, wherein the method comprises:

obtaining vehicle information of a driving vehicle on a toll road, wherein the vehicle information has a corresponding user account on a payment platform;

publishing a vehicle travel history to a blockchain network by using a first blockchain node corresponding to the tolling system in the blockchain network,

wherein the vehicle travel history comprises a travelled distance of the driving vehicle on the toll road; ~~and~~

in response to determining that the driving vehicle approaches an exit of the toll road, determining, by an anchor node of the blockchain network associated with the tolling system, a toll fee corresponding to the travelled distance;

determining, by the anchor node, a first blockchain asset equivalent in value to the toll fee is less than or equal to a second blockchain asset of a user account associated with the driving vehicle and on the payment platform; and

performing, by the anchor node, an asset transfer operation between an offchain asset in the user account and the first blockchain asset in a blockchain account of the tolling system. ~~based on the vehicle travel history each time the driving vehicle approaches any exit of the toll road, so as to charge an asset corresponding to the travelled distance~~.

11. The method according to claim 10, wherein performing the asset transfer operation ~~the initiating an asset charging request for the vehicle information to the payment platform each time the driving vehicle approaches any exit of the toll road~~ comprises:

when the driving vehicle approaches the ~~any~~ exit of the toll road, initiating the asset charging request for the vehicle information to the payment platform; and

after the asset corresponding to the travelled distance is charged, resetting the travelled distance to recalculate the travelled distance.

12. An open road tolling apparatus, applied to a tolling system, wherein the apparatus comprises:

an acquisition unit, configured to obtain vehicle information of a driving vehicle on a toll road, wherein the vehicle information has a corresponding user account on a payment platform;

a publishing unit, configured to publish a vehicle travel history to a blockchain network by using a first blockchain node corresponding to the tolling system in the blockchain network, wherein the vehicle travel history comprises a travelled distance of the driving vehicle on the toll road; and

an implementation unit, configured to:

in response to determining that the traveled distance reaches a predetermined distance, determine a toll fee corresponding to the predetermined distance;

determine, a first blockchain asset equivalent in value to the toll fee is less than or equal to a second blockchain asset of a user account associated with the driving vehicle and on the payment platform; and

perform an asset transfer operation between an offchain asset in the user account and the first blockchain asset in a blockchain account of the tolling system ~~related to the payment platform based on the vehicle travel history each time the travelled distance of the driving vehicle on the toll road reaches a predetermined distance, so as to charge an asset corresponding to the predetermined distance~~.

13. The apparatus according to claim 12, wherein the acquisition unit is specifically configured to:

perform an information acquisition operation on ~~a~~the driving vehicle on a corresponding section of the toll road by using a first Internet of Things device associated with the tolling system; and

determine the vehicle information of the driving vehicle based on information obtained by the first Internet of Things device.

14. The apparatus according to claim 13, wherein several first Internet of Things devices are separately installed at corresponding locations on the toll road, and a spacing between adjacent first Internet of Things devices is not greater than the predetermined distance; and the apparatus further comprises:

a determining unit, configured to determine that the travelled distance of the driving vehicle reaches the predetermined distance when multiple first Internet of Things devices successively obtain the vehicle information of the driving vehicle and a total spacing ~~between~~ encompassed by an entirety of the multiple first Internet of Things devices is the predetermined distance.

15. The apparatus according to claim 13, wherein the first Internet of Things device comprises at least one of the following: a monitoring device, an RFID reader, a Bluetooth device, an optical sensor, and a signal receiver.

16. The apparatus according to claim 13, wherein the acquisition unit is specifically configured to:

when it is determined that there is ~~a~~ the driving vehicle on the corresponding ~~toll road~~ section of the toll road by using the first Internet of Things device, further perform an information acquisition operation on the driving vehicle by using the first Internet of Things device; or

when it is determined that there is ~~a~~ the driving vehicle on the corresponding toll

road section by using a second Internet of Things device associated with the tolling system, further perform an information acquisition operation on the driving vehicle by using the first Internet of Things device.

17. The apparatus according to claim 12, wherein the implementation unit is specifically configured to:

each time the travelled distance reaches the predetermined distance, initiate an asset charging request for the vehicle information to the payment platform, wherein the asset charging request comprises an identifier of the vehicle travel history; and

charge an asset transferred by the payment platform from the user account; or when a limit of credit of the user account is not exceeded, charge a credit asset related to the user account and transferred by the payment platform.

18. The apparatus according to claim 12, wherein the implementation unit is specifically configured to:

each time the travelled distance reaches the predetermined distance, initiate a contract operation used for asset transfer by using the first blockchain node, wherein a validation condition of the contract operation comprises that the travelled distance reaches the predetermined distance; and

after the contract operation takes effect, receive, by using the first blockchain node, a blockchain asset corresponding to the predetermined distance and transferred by a second blockchain node corresponding to the payment platform in the blockchain network, wherein an offchain asset equivalent to the blockchain asset is deducted from the user account by the payment platform.

19. The apparatus according to claim 12, wherein the implementation unit is specifically configured to:

perform an asset transfer operation related to the payment platform based on the vehicle travel history each time the travelled distance of the driving vehicle on the toll road reaches the predetermined distance; and

after the asset corresponding to the predetermined distance is charged, reset the travelled distance to recalculate the travelled distance.

20. The apparatus according to claim 12, further comprising:

a querying unit, configured to: when ~~any~~a vehicle drives to an entrance of the toll road, initiate a query request to the payment platform based on vehicle information of the ~~any~~ vehicle; and

a control unit, configured to: when it is determined that a user account

corresponding to the vehicle information of the ~~any~~ vehicle exists on the payment platform, allow the ~~any~~ vehicle to pass, so that the ~~any~~ vehicle enters the toll road,~~;~~ otherwise, refuse the ~~any~~ vehicle to pass.

21. An open road tolling apparatus, applied to a tolling system, wherein the apparatus comprises:

an acquisition unit, configured to obtain vehicle information of a driving vehicle on a toll road, wherein the vehicle information has a corresponding user account on a payment platform;

a publishing unit, configured to publish a vehicle travel history to a blockchain network by using a first blockchain node corresponding to the tolling system in the blockchain network, wherein the vehicle travel history comprises a travelled distance of the driving vehicle on the toll road; and

an implementation unit, configured to:

in response to determining that the driving vehicle approaches an exit of the toll road, determine a toll fee corresponding to the travelled distance;

determine a first blockchain asset equivalent in value to the toll fee is less than or equal to a second blockchain asset of a user account associated with the driving vehicle and on the payment platform; and

perform an asset transfer operation between an offchain asset in the user account and the first blockchain asset in a blockchain account of the tolling system.~~related to the payment platform based on the vehicle travel history each time the driving vehicle approaches any exit of the toll road, so as to charge an asset corresponding to the travelled distance.~~

22. The apparatus according to claim 21, wherein the implementation unit is specifically configured to:

when the driving vehicle approaches the ~~any~~ exit of the toll road, initiate ~~the~~an asset charging request for the vehicle information to the payment platform; and

after the asset corresponding to the travelled distance is charged, reset the travelled distance to recalculate the travelled distance.

23. An electronic device, comprising:

a processor; and

a memory, configured to store a processor-executable instruction, wherein

the processor is configured to perform the method according to any one of claims 1 to 11.