

Thus, there is a need for a technological solution to provide a partitioned blockchain that is capable of storing multiple transaction formats and types in a single blockchain, reducing the computing resources and processing power required for deployment and operation of the blockchain, while also providing
5 for enhanced usage of permissions for permissioned blockchains.

SUMMARY

The present disclosure provides a description of systems and methods for generation of blocks for a partitioned blockchain. The use of a partitioned
10 blockchain may enable a single blockchain to store transaction records for a plurality of different blockchains, reducing the deployment necessary for implementing the plurality of blockchains to the single, partitioned blockchain. In addition, the partitioning of the transaction records in the blockchain may enable limitations on the access to the transaction records due to the ability for
15 the records to be formatted differently in each partition.

In an aspect, the present disclosure refers to a method for generation of blocks for a partitioned blockchain, comprising: storing, in a memory of a processing server, at least one block comprising a partitioned blockchain, wherein the at least one block includes a most recently added block, the most
20 recently added block including at least a header and one or more transaction entries; receiving, by a receiving device of the processing server, at least one transaction data entry or transaction record for each of a plurality of subnets, wherein each of the at least one transaction data entries is unformatted according to semantics associated with the respective subnet of the plurality of
25 subnets and each of the at least one transaction records is formatted according to semantics associated with the respective subnet of the plurality of subnets, each subnet being a partition in the partitioned blockchain that is representative of a category, group or other demarcation of transaction records and the semantics including the rules or other data regarding the formatting and usage of
30 transaction records; generating, by a hashing module of the processing server, a hash value via application of one or more hashing algorithms to at least the header included in the most recently added block; formatting, by a generation module of the processing server, any transaction data entries to generate a transaction record formatted according to semantics associated with the
35 respective subnet of the plurality of subnets; generating, by a generation module of the processing server, a new block header, wherein the new block header includes at least the generated hash value, a timestamp, and a sequence of pairs

including a pair for each of the plurality of subnets, each pair including at least a subnet identifier associated with the respective subnet and a merkle root of each of the at least one received or generated transaction records for the respective subset; generating, by the generation module of the processing server, a new
5 block, wherein the new block includes at least the generated new block header and the at least one received or generated transaction record for each of the plurality of subnets; and electronically transmitting, by a transmitting device of the processing server, at least the generated new block to a plurality of nodes associated with the partitioned blockchain.

10 In another aspect, the present disclosure refers to a system for generation of blocks for a partitioned blockchain, comprising: a memory of a processing server configured to store at least one block comprising a partitioned blockchain, wherein the at least one block includes a most recently added block,
the most recently added block including at least a header and one or more
15 transaction entries; a receiving device of the processing server configured to receive at least one transaction data entry or transaction record for each of a plurality of subnets, wherein each of the at least one transaction data entries is unformatted according to semantics associated with the respective subnet of the plurality of subnets and each of the at least one transaction records is formatted
20 according to semantics associated with the respective subnet of the plurality of subnets, each subnet being a partition in the partitioned blockchain that is representative of a category, group or other demarcation of transaction records and the semantics including rules or other data regarding the formatting and usage of transaction records; a hashing module of the processing server
25 configured to generate a hash value via application of one or more hashing algorithms to at least the header included in the most recently added block; a generation module of the processing server configured to format any transaction data entries to generate a transaction record formatted according to semantics associated with the respective subnet of the plurality of subnets; generate a new
30 block header, wherein the new block header includes at least the generated hash value, a timestamp, and a sequence of pairs including a pair for each of the plurality of subnets, each pair including at least a subnet identifier associated with the respective subnet and a merkle root of each of the at least one received or generated transaction records for the respective subnet, and generate a new
35 block, wherein the new block includes at least the generated new block header and the at least one received or generated transaction record for each of the plurality of subnets; and a transmitting device of the processing server configured to electronically transmit at least the generated new block to a plurality of nodes associated with the partitioned blockchain.

In an example, a method for generation of blocks for a partitioned blockchain includes: storing, in a memory of a processing server, at least one block comprising a partitioned blockchain, wherein the at least one block includes a most recently added block, the most recently added block including at least a header and one or more transaction entries; receiving, by a receiving device of the processing server, at least one transaction data entry for each of a plurality of subnets; generating, by a hashing module of the processing server, a hash value via application of one or more hashing algorithms to at least the header included in the most recently added block; generating, by a generation module of the processing server, a new block header, wherein the new block header includes at least the generated hash value, a timestamp, and a sequence of pairs including a pair for each of the plurality of subnets, each pair including at least a subnet identifier associated with the respective subnet and a merkle root of each of the at least one transaction data entries received for the respective subnet; generating, by the generation module of the processing server, a new block, wherein the new block includes at least the generated new block header and the at least one transaction data entry for each of the plurality of subnets; and electronically transmitting, by a transmitting device of the processing server, at least the generated new block to a plurality of nodes associated with the partitioned blockchain.

In an example, a system for generation of blocks for a partitioned blockchain includes: a memory of a processing server configured to store at least one block comprising a partitioned blockchain, wherein the at least one block includes a most recently added block, the most recently added block including at least a header and one or more transaction entries; a receiving device of the processing server configured to receive at least one transaction data entry for each of a plurality of subnets; a hashing module of the processing server configured to generate a hash value via application of one or more hashing algorithms to at least the header included in the most recently added block; a generation module of the processing server configured to generate a new block header, wherein the new block header includes at least the generated hash value, a timestamp, and a sequence of pairs including a pair for each of the plurality of subnets, each pair including at least a subnet identifier associated with the respective subnet and a merkle root of each of the at least one transaction data entries received for the respective subnet, and generate a new block, wherein the new block includes at least the generated new block header and the at least one transaction data entry for each of the plurality of subnets; and a transmitting device of the processing server configured to electronically transmit at least the generated new block to a plurality of nodes associated with the partitioned blockchain.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

The scope of the present disclosure is best understood from the following detailed description of exemplary embodiments when read in conjunction with the accompanying drawings. Included in the drawings are the following figures:

FIG. 1 is a block diagram illustrating a high level system architecture for the generation and implementation of a partitioned blockchain in accordance with exemplary embodiments.

FIG. 2 is a block diagram illustrating the processing server of FIG. 1 for the generation of blocks and addition thereof in a partitioned blockchain in accordance with exemplary embodiments.

FIG. 3 is a flow diagram illustrating a process for the generation of a block header for use in a partitioned blockchain having multiple subnets using the processing server of FIG. 2 in accordance with exemplary embodiments.

WHAT IS CLAIMED IS:

1. A method for generation of blocks for a partitioned blockchain, comprising:
 - storing, in a memory of a processing server, at least one block comprising a partitioned blockchain, wherein the at least one block includes a most recently added block, the most recently added block including at least a header and one or more transaction entries;
 - receiving, by a receiving device of the processing server, at least one transaction data entry or transaction record for each of a plurality of subnets, wherein each of the at least one transaction data entries is unformatted according to semantics associated with the respective subnet of the plurality of subnets and each of the at least one transaction records is formatted according to semantics associated with the respective subnet of the plurality of subnets, each subnet being a partition in the partitioned blockchain that is representative of a category, group or other demarcation of transaction records and the semantics including rules or other data regarding the formatting and usage of transaction records;
 - generating, by a hashing module of the processing server, a hash value via application of one or more hashing algorithms to at least the header included in the most recently added block;
 - formatting, by a generation module of the processing server, any transaction data entries to generate a transaction record formatted according to semantics associated with the respective subnet of the plurality of subnets;
 - generating, by a generation module of the processing server, a new block header, wherein the new block header includes at least the generated hash value, a timestamp, and a sequence of pairs including a pair for each of the plurality of subnets, each pair including at least a subnet identifier associated with the respective subnet and a merkle root of each of the at least one received or generated transaction records for the respective subnet;
 - generating, by the generation module of the processing server, a new block, wherein the new block includes at least the generated new block header and the at least one received or generated transaction record for each of the plurality of subnets; and

electronically transmitting, by a transmitting device of the processing server, at least the generated new block to a plurality of nodes associated with the partitioned blockchain.

5 2. The method of claim 1, further comprising:
generating, by the hashing module of the processing server, the merkle root for each of the plurality of subnets via application of one or more hashing algorithms to each of the at least one received or generated transaction records for the respective subnet.

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3. The method of claim 1, wherein receiving the at least one transaction record for each of the plurality of subnets further includes receiving the merkle root for each of the plurality of subnets.

4. The method of claim 1, further comprising:
15 generating, by the generation module of the processing server, an updated partitioned blockchain by adding the generated new block to the partitioned blockchain, wherein

transmitting the generated new block includes transmitted the generated updated partitioned blockchain including the generated new block.

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5. The method of claim 1, wherein each of the at least one received or generated transaction records for each of the plurality of subnets includes at least the subnet identifier associated with the respective subnet.

25 6. The method of claim 1, further comprising:
storing, in a subnet database of the processing server, a plurality of subnet profiles, wherein each subnet profile includes a structured data set related to a subnet including at least a subnet identifier and one or more semantics.

30 7. The method of claim 6, wherein each of the at least one received or generated transaction records for a subnet are formatted based on the one or more semantics included in a subnet profile that includes the associated subnet identifier.

8. The method of claim 6, wherein the merkle root associated with a subnet is generated using one or more hashing algorithms based on the one or more semantics included in a subnet profile that includes the associated subnet identifier.

5 9. The method of claim 1, wherein the generated new block header further includes a version number, a difficulty target, and a nonce.

10. The method of claim 9, wherein the nonce is received from one of the plurality of nodes associated with the partitioned blockchain.

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11. A system for generation of blocks for a partitioned blockchain, comprising:

a memory of a processing server configured to store at least one block comprising a partitioned blockchain, wherein the at least one block includes a most recently added block, the most recently added block including at least a header and one or more transaction entries;

a receiving device of the processing server configured to receive at least one transaction data entry or transaction record for each of a plurality of subnets, wherein each of the at least one transaction data entries is unformatted according to semantics associated with the respective subnet of the plurality of subnets and each of the at least one transaction records is formatted according to semantics associated with the respective subnet of the plurality of subnets, each subnet being a partition in the partitioned blockchain that is representative of a category, group or other demarcation of transaction records and the semantics including rules or other data regarding the formatting and usage of transaction records;

a hashing module of the processing server configured to generate a hash value via application of one or more hashing algorithms to at least the header included in the most recently added block;

a generation module of the processing server configured to format any transaction data entries to generate a transaction record formatted according to semantics associated with the respective subnet of the plurality of subnets;

generate a new block header, wherein the new block header includes at least the generated hash value, a timestamp, and a sequence of pairs including a pair

for each of the plurality of subnets, each pair including at least a subnet identifier associated with the respective subnet and a merkle root of each of the at least one received or generated transaction records for the respective subnet, and

5 generate a new block, wherein the new block includes at least the generated new block header and the at least one received or generated transaction record for each of the plurality of subnets; and

a transmitting device of the processing server configured to electronically transmit at least the generated new block to a plurality of nodes associated with the partitioned blockchain.

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12. The system of claim 11, wherein the hashing module of the processing server is further configured to generate the merkle root for each of the plurality of subnets via application of one or more hashing algorithms to each of the at least one received or generated transaction records received for the respective subnet.

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13. The system of claim 11, wherein receiving the at least one transaction record for each of the plurality of subnets further includes receiving the merkle root for each of the plurality of subnets.

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14. The system of claim 11, wherein the generation module of the processing server is further configured to generate an updated partitioned blockchain by adding the generated new block to the partitioned blockchain, and

25 transmitting the generated new block includes transmitted the generated updated partitioned blockchain including the generated new block.

15. The system of claim 11, wherein each of the at least one received or generated transaction records for each of the plurality of subnets includes at least the subnet identifier associated with the respective subnet.

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16. The system of claim 11, further comprising:
a subnet database of the processing server configured to store a plurality of subnet profiles, wherein each subnet profile includes a structured data set related to a subnet including at least a subnet identifier and one or more semantics.

17. The system of claim 16, wherein each of the at least one received or generated transaction records for a subnet are formatted based on the one or more semantics included in a subnet profile that includes the associated subnet identifier.

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18. The system of claim 16, wherein the merkle root associated with a subnet is generated using one or more hashing algorithms based on the one or more semantics included in a subnet profile that includes the associated subnet identifier.

10 19. The system of claim 11, wherein the generated new block header further includes a version number, a difficulty target, and a nonce.

20. The system of claim 19, wherein the nonce is received from one of the plurality of nodes associated with the partitioned blockchain.